

Joan D. Vinge • Joe Haldeman • Larry Niven

# Galileo

MAGAZINE OF SCIENCE & FICTION



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and the incredible conclusion of  
**THE RINGWORLD ENGINEERS**



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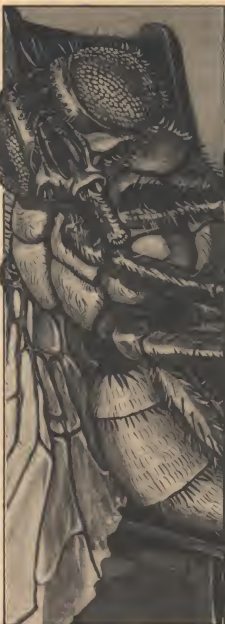
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# Editorial

Joe Haldeman

## Looking Backward

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**S**OMETIMES THE lessons of history can be comforting. I just attended the annual meeting of the National Space Institute, and am mighty relieved to know the story of Columbus.

If you're as old as I am, you were probably taught in grade school that Columbus insisted the world was round, in spite of expert opinion to the contrary, and Queen Isabella bravely hocked her jewels to give him a chance to prove it. That wasn't so, of course.

Columbus was an expert sailor who possessed phenomenal reserves of stubbornness and patience, and he probably had other virtues, but geographical preciseness was not one of them. The argument he presented to Isabella was compounded equally of bad arithmetic and bizarre theology. He believed that the Books of Isaiah and Esdras revealed that there was a clear shot across the Atlantic to the Orient, and he was able to compute the distance from various classical sources. His calculations put Japan somewhere around Des Moines.

Isabella assembled a panel of "learned men and mariners," who examined Columbus's claim and (after four years of deliberation) pronounced it nonsense. Nevertheless, Columbus persisted, while his brother was unsuccessfully wooing the kings of France and England, and managed to be turned down a second time. She finally decided to risk the money, in defiance of expert opinion, when an ally of Columbus pointed out that the whole expedition would cost less than a week's entertainment of a foreign prince.

The experts were right and Columbus was dead wrong—died, in fact, thinking that the Caribbean he'd discovered was "Mango province...next to that of Cathay." But his name is immortal and the experts have become ironic footnotes to history.



The National Space Institute is a "privately-supported educational organization dedicated to telling the public about the benefits of space technology." It does the worthy job of trying to convince government and industry that there is something more to space than the absence of air. But it is painfully conservative, straight.

The NSI meeting this year was to have been a celebration of technology, the tenth anniversary of Apollo 11. But current events put a damper on it: the DC-10 disaster, gasoline lines, SALT nightmares, the possibility that Skylab might fall on Three Mile Island. At no time in recent history had American confidence in technology crept to such a low ebb, and the beginning of the meeting reflected this mood.

The conference had a worthy and interesting aim. NSI had assembled a large document called "Public Needs and Space Program Options." In its final form, this document (SPO for short) would present a comprehensive national space program for the next twenty years; one both acceptable to taxpayers and enticing to politicians. Our charge at the conference was to discuss the preliminary SPO so that the organization could refine it into a compelling document that would be presented to President Carter, and to other 1980 candidates, and to the platform committees of the two parties.

As I read through the SPO, though, I was constantly distracted by the sound of well-meaning folks barking up the wrong tree.

What NSI had compiled was a comprehensive encyclopedia of prosaic uses of Earth satellites, mostly in low Earth orbit, some as high as geosynchronous. The most daring proposal on the list was a five-year R&D program to investigate the feasibility of a solar power satellite. Most of the rest were various

comsats and environmental monitor-type satellites.

Bad sales job.

We won't have two votes to rub together if we try to sell the public space travel on a platform stressing only the practical benefits of space technology. On side issues, most Americans are impulse voters, and to most of them space is an obscure, unimportant issue. We will get no sympathy from them unless we excite them emotionally. We can't do that unless we shift our emphasis from machines in space to people in space.

Look at what we have to offer! Red-blooded adventure, a chance to probe the unknown—the only physical frontier left, the exploitation of which may send home virtually unlimited energy and raw materials. Nothing else their tax dollars can buy is remotely as exciting; nothing promises so large a return for a relatively small investment.

But it does have to be sold. And it won't be sold only on the basis of satellites that monitor fish populations and lumber harvests, even if the NSI is right in that those types of applications provide the quickest payback for the smallest risk. We can offer them that and the stars as well.

A few of the panelists shared my feelings. Harrison Schmidt declared that he believed the parents of the first Martians were alive. James Michener called for a "space spectacular," even if it required false rationalizations to the politicians and general public. But most of the people were content to grind their own particular axes within the limited context defined by the SPO.

The final mood of the conference was predictably complacent and self-congratulatory. I don't doubt that the final version of the SPO will be a slightly streamlined clone of the one we saw. But I think that may ultimately be of little importance.

Let's look at Columbus again, with nearly five hundred years of perspective. Think of his zany arguments as a primitive sort of SPO. Isabella finally talked herself into financing him, but probably not because his arguments had won her over—not after they had been demolished by her experts. It was a fine adventure for her court to sponsor, at not too great a cost, and if he did somehow find the Indies, the reward would be of great practical value: in those days before refrigeration, Europeans badly needed spices such as nutmeg and cloves, to cover up the taste of rotten meat.

Instead, Columbus's voyage led directly to the explosion of European influence into the Western Hemisphere—the most dramatic cultural diaspora in human history.

It would have happened anyhow. If not a Columbus, then a Cabot, a Vespucci, a

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# The Courage To Dream...

This is the essence of Science Fiction. The spirit of our future is in the story of pioneers; the inner need for adventure, the love of truth, each individual's search for a place of his or her own. **Galileo** is the magazine of things to come. **Galileo** is the new magazine of great science fiction and the new frontiers of science fact. Articles by major scientists like Carl Sagan, David Wilson, and Arthur C. Clarke explore such topics as atomic and genetic research, astrophysics, and the coming computer technology. Reviews, interviews and previews are highlighted by Robert Silverberg, Marvin Kaye and David Gerrold on books, games and movies. Lighter subjects include fashions of the future, automobiles of tomorrow, and bicycles in space. Superb illustration by the

finest artists in the field titillate the imagination. But the best parts are the stories, where science becomes the future, by such authors as Harlan Ellison, Marion Zimmer Bradley, and Jack Williamson. Great novels like Larry Niven's long-awaited sequel **THE RINGWORLD ENGINEERS** are serialized complete and uncut. From pathos to adventure, from the horrific to visions of the ideal, it's yours.



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# Pro-File

## Letty Hummel

Clockwise from upper right: Joan Vinge, Alice Laurence, Ray Ellis, and Justin Leiber with friend.

**G**ALILEO IS celebrating the holidays with Joe Haldeman, Robert Heinlein, Justin Leiber, Robert Silverberg, Joan D. Vinge, and a gathering of fine new writers. For the serious-minded we've taken a look at legal rights: property rights, the rights of intelligent apes and computers, the rights of unborn children, and our right to the frontiers of space. For the fun-loving we have a dieter's revenge story and for Silverberg fans we look at a famous writer's harried experiences with the press at SEACON. We also say sayonara to Louis Wu and the Ringworld with the final episode of Larry Niven's "The Ringworld Engineers." If you're celebrating with us, we can't think of a better way to deck your halls than to do it with the books, calendars, and fine art previewed in our special gift essay. There are some eighty gift ideas here for fantasy and science fiction lovers ranging from hardcover remainders for the budget-conscious to original art for those living the high life.

Will it be curtains for Louis Wu? Can the Ringworld be saved? Well... we can't spoil the fun so you'll just have to read this last episode of "The Ringworld Engineers" which completes our four-part serialization of the Larry Niven novel begun in issue 13. Though this is the last of Louis, Niven fans can look forward to several new works including another adventure from Gil the ARM titled *The Patchwork Girl* to be published by ACE in April 1980. It's an SF mystery in the "locked-room" tradition set on the Moon. Followers of SF's celebrated writing partners, Niven and Pournelle, can expect a sequel to their best seller, *Mote In God's Eye*, but it's on hold until a biological stumbling block can be worked out. Until then, look for another sequel to their story, "Spirals", published recently in *Destiny*. Niven just doesn't stop. He's also collaborating with Steve Barnes on a

suspense novel called *Dreampark*. The setting is California in 2055, where a Disneyland-like entertainment park has saved the L.A. economy.

Extraordinary characters, male and female, possessed of dignity and intelligence have become a Joan D. Vinge hallmark. She makes her first appearance in *Galileo* this issue with "Fool's Gold," a sequel to a story in her "Heaven Belt" future history. Since her first story, "Tin Soldier," was published in *Orbit 14*, she has written some ten short stories in various magazines and anthologies, including *Millennial Women* and Robert Silverberg's novella anthology, *The Crystal Ship*, for which she wrote the title story. When Ben Bova asked her to write the lead story for a women's issue he was editing for *Analogue*, "Eyes of Amber" won her a Hugo. Ms. Vinge has a degree in anthropology and once worked briefly as an archaeologist before turning to writing full-time. After a long hiatus she is again pursuing her long-time interest in art and has just finished her second novel, *The Snow Queen* which will be published by Quantum next April. She lives in Chappaqua, New York.

A sudden image of a man drinking champagne from the bottle, in a tacky little house, staring at a priceless work of art served as the inspiration for Alice Laurence to work with the concept of property rights in her story "Nine-Tenths

of the Law." Since her first appearance in *Galileo* ("Nobody Loves a Moebius Strip," issue 11-12) she has finished co-editing a mystery anthology with Isaac Asimov called *Who Done It?* to be published by Houghton Mifflin. She suspects that beginning to write and having a baby are the most important things that have happened to her. The two, she says, are more closely related than is immediately obvious.

John Alfred Taylor sets his cyborg hero, George Grieve, on his third adventure in this issue's story, "Too Close To Home." George Grieve first appeared in "Changeling," issue #11-12, and then in "Grave II," issue #13. (Mr. Taylor tells us, however, that neither he nor George like the word "cyborg.") A prize-winning poet whose motto is "A poem a day keeps the madhouse away," he got interested in science fiction before he was old enough to know better. Mr. Taylor, who wishes that some millionaire out of nowhere would buy him a micro-computer, says these are the most important things he's ever done: "surviving the first two weeks after being born too early, having my mother show me spirogyra through a microscope, and being exposed to Dorothy and Toto and John Carter at an early age."

From time to time *Galileo* editor Charles C. Ryan opens his editorial page [Continued on page 95]

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## The Great Galileo Guide to Fantastic Gifts

Letty Hummel, Floyd Kemske, and Andrew A. Whyte

**T**HIS ARTICLE is not intended for fantasy and science fiction fans. It is intended for people who have to buy gifts for fantasy and science fiction fans. So if you're a fan, be on your way. Go read a book or something, but leave this article lying around where a likely gift-giver can find it.

Now, all you gift-givers pay attention. You will have to work a little bit here. You have to know what the giftee is likely to want. All we can do is give you an idea of what these various items are about and, in some cases, tell you what we think of them. We want to warn you, however. Just because something is listed here

doesn't mean we recommend it. We just want you to know what is available. We have concentrated on books and calendars because they are the things we know best, but at the end of the essay you will find some ideas for more unusual science fiction-related gifts. If this isn't enough to get you started, you'll just have to give it up and give your favorite fan a gift subscription to *Galileo*.

### CALENDARS

**T**HERE ARE twenty-four calendars on the market this year which have fantasy and science fiction themes. Most of them are

wall calendars, but there is a smattering of desk calendars and engagement books. You can buy a calendar based on a book or a film, a calendar based on the work of a single science fiction or fantasy artist, one based on a fantasy or science fiction theme, a calendar of completely new—rather than previously published—artwork, or various combinations of the above.

The *Faeries Calendar* is \$6.95 from Bantam. It is a companion to the successful book of the same name by Brian Froud and Alan Lee. Most of the illustrations in it are taken from the book, although the artists contributed some new drawings. Classic poems com-

memorate each month and there are a few notations for dates of interest to faerie watchers, as well as national holidays. There is also a *Faeries Engagement Calendar* (\$7.95 from Bantam) which uses major paintings and is edited by David Larkin, who devised the original book. Once again, Bantam has published a *Gnomes Calendar* at \$6.95.

For followers of the most successful science fiction film of the year, there is *Heavy Metal Presents the 1980 Alien Calendar* (published by *Heavy Metal Magazine* and selling for \$5.95). It was originally planned to use just material from the magazine, but the people of that publication were so swept away by *Alien* (they have published a couple of books on it so far) that they have devoted the entire calendar to stills from the film. We haven't seen it, but we're tempted to warn away the squeamish.

Ballantine has published *The Black Hole 1980 Calendar* at \$5.95, which is devoted to "production art" from the Walt Disney film. We haven't seen it, but this sounds very promising, since the mattes for this film were done by the award-winning artist Peter Ellenshaw. A center spread features stills from the film.

Strangely enough, there are only two Star Trek calendars this year. One is *The Official U.S.S. Enterprise Officers' Datebook for 1980* (from Wallaby, \$6.95), for those who want to schedule their lives around this phenomenon. It has black and white and color stills from the Star Trek film, with a typeface "the same as on all star ships." The ads say it could be used by Federation officers, so if you're a Klingon, forget it. The other Star Trek calendar is *The 1980 Star Trek Wall Calendar* (Wallaby, \$5.95), which is all color photos from the film.

*The 1980 Star Wars Poster Art Calendar* (\$5.95 from Ballantine) is the most creative idea we have heard of in this whole film tie-in business. It is made up entirely of *Star Wars* film posters from all countries, including France, Hong Kong, Sweden, Italy, Japan, Israel, Spain, and Norway.

Despite what you might think (or hope), *Battlestar Galactica* has not yet gone away and this year sees publication of *The Battlestar Galactica Calendar, 1980* (Windmill Books, \$4.95), with stills from the television show and its spin-off movie.

*The Official Mork and Mindy 1980 Calendar* (Wallaby, \$4.95) appears to strive for the same zaniness you see on the television series, since it notes "Orkan holidays" such as Frizbat Founders Day. It also has the usual Earth holidays.

About *The Rocky Horror Picture Show 1980 Calendar* (\$5.95 from Golden-Lee Book Distributors), your guess is as good as ours. We haven't seen it, but we

haven't looked for it, either.

We found six calendars devoted to specific artists. Geoffrey Chandler did the twelve paintings for the *Celestial Calendar for 1980* (Heron Press, \$5.95) and it has notations on planetary movements, meteor showers, and other celestial phenomena. The *Frank Frazetta Calendar 1980* (Bantam, \$5.95) features full-color reproductions of the artist's sensual paintings. Michael Hague produced the pictures specifically for *The Ariel Fairyland Calendar 1980* (\$5.95 and distributed by Simon and Schuster). This year, Big O has published its third Rodney Matthews calendar under the title *Terrestrial Voyages: Rodney Matthews 1980 Calendar* (\$9.95) in a large (16 1/2 x 16 1/2) size. It is a collection of twelve illustrations from book jackets, record cases, and covers from the English magazine *Vortex*, all of which are seen here for the first time in this country. The calendar is remarkable in that the artist has designed the complete package, including the borders around the paintings and an impenetrable typeface. The *Boris Vallejo Fantasy Calendar 1980* (Workman, \$5.95) features a well-produced series of previously published paintings by the popular artist. All Vallejo paintings depict the same two people, one of whom looks remarkably like Boris Vallejo. *Journey 1980* does not yet have an American distributor. Designed and illustrated by Chris Moore, it is this English artist's collection of book covers and magazine material in a panoramic style with cinematic production values. It is a personal showcase of spaceship art. Our affiliate bookstore ordered a small supply of them when we were in England for the World Science Fiction Convention, so you could order one from Avenue Victor Hugo in Boston.

We have to put the *Monster of the Month Calendar for 1980* (Recycled Paper Products, \$5.00) in a class by itself. We haven't seen it, but we are willing to take the risk of saying that it is probably made up of pictures of film monsters.

There are four calendars which collect the work of different artists on specific themes. Starlog Press is the publisher for *Space Art Calendar 1980* (5.95), which features paintings by Ron Miller, David Egge, Chesley Bonestell, and Luke Pesek, among others. The calendar gives astronomical dates and space events, anniversaries of man's achievements in space, and other relevant dates to that theme. The approach is similar with *The 1980 J.R.R. Tolkien Calendar: The Great Illustrators Edition* (Ballantine, \$5.95), which includes paintings by Carl Lundgren, Darrell Sweet, and Michael Whelan, as well as mainstream artists who have never worked in the field of fantasy before. This year's Tolkien calendar has complete Middle-Earth chronological information. *Visions: A Calendar for 1980*

(Pomegranate Press, \$4.95—distributed by Crown/Harmony) is representative of a school of California-based artists whose work is characterized by muted surrealism and imagined landscapes. Something of a companion to *Visions* is *The Unicorn: A Calendar for 1980* (Pomegranate Press, \$4.95—distributed by Crown/Harmony), comprising unicorn pictures by the *Visions* artists.

There are three other calendars which marginally belong on a shopping list for fantasy and science fiction lovers. *Beauty and the Beast 1980 Calendar* (Green Tiger Press, \$12.50) features pictures by Michael Hague. They are all tipped-in color prints depicting scenes from the fairy tale. *Enchantments 1980 Calendar* (Green Tiger Press, \$10.00) also has tipped-in color prints (this time by Bill and Lynn Teeple, the well-known children's book artists) giving views of faeries. *The Space 1980 Calendar* (*Astronomy Magazine*, \$5.95) has illustrations from "the world's most beautiful astronomy magazine."

## ART BOOKS

**S**TILL HERE, huh? Well, if you don't want to give a calendar, maybe you want to consider an art book. Art books are pretty and make a good first impression. They are usually fairly luxurious and many fans cannot afford to collect them, so you don't have to worry about duplication in the giftee's collection. Just about all art books are nice to look at. On the other hand, there are a few which will be sufficiently representative or influential that they ought to be singled out. We have noted these as "collector's items," a title we do not confer lightly.

*Sentinel* by Syd Mead (Big O, \$8.95) is a paperback, large format collection of futuristic paintings by an artist with an extensive industrial background who has designed spaceships for NASA, automobiles for Chrysler, and other "American dream machinery." A vision of tomorrow from the corporate view and good for the gadget lover or technology freak.

Chris Foss is an influential science fiction artist and *21st Century Foss* (Big O, \$9.95 pb) is a retrospective collection of previously published color paintings from the undisputed master of the Baroque spaceship. The style is imposing and colorful; there is nothing intimate about it. Whether or not you like this kind of thing, we think it is a best bet as a collector's item.

*Giger's Alien* by H.R. Giger (Big O, \$14.95 pb) details in pictures the Swiss artist's origination of the Alien. It includes virtually everything you did not see on the screen and it is bound to be a nightmarish vision comparable to Giger's *Necronomicon* (Big O, \$14.95 pb).



Giger's *Alien* is likely to appear late and might not be available in time for Christmas; *Necronomicon* has been on the shelves for some time, if there are any left.

Ian Summers edited *Art of the Brothers Hildebrandt* (Ballantine, \$15.00 hb, \$8.95 pb), a showcase of the work of Tim and Greg Hildebrandt. It is a well-produced collection of paintings by a pair of popular artists, but is less a book than an art catalogue despite lively comment by the editor.

*Green Dog Trumpet and Other Stories* (Big O, \$8.95 pb) by Ian Miller presents bizarre, wordless stories set in various malevolent fairylands dominated by futuristic war machines and treacherous toys. The stories, achieving an unusual combination of wit and horror, are nevertheless fascinating. The style is vaguely medieval, but well engineered.

As most Tolkien lovers are aware, the mythmaker himself was an artist. *Pictures* (Houghton Mifflin, \$30.00 hb) is a virtually complete collection of the pen-and-ink drawings—many of which are colored—of J.R.R. Tolkien. The book is slipcased, shrink-wrapped, and calculated to appeal to a broader audience than just well-heeled Tolkien completists. The introduction and notes by his son, Christopher Tolkien, give the history of each picture.

Boris Vallejo emerges as a personality from *Boris Book II* (Anaconda Press, \$7.95 pb), a well-printed collection of work with a lot of text and some photos of the popular artist himself. The paintings of well-muscled men and large-breasted women are representative Boris and strictly for panting over.

The artist for *A Middle-Earth Album* (Fireside, \$7.95 pb, \$14.95 hb) is Joan Wyatt, who has prepared thirty original color paintings of the mythical land. There is text by Jessica Yates of the Tolkien Society and the artist has attempted to adhere faithfully to Tolkien's descriptions of specific scenes from his work.

*Wonderworks* (The Donning Company, \$7.95 pb, \$13.95 hb) by Michael Whelan is one of the Starblaze Editions edited by Polly and Kelly Freas. It is a personal and comprehensive showcase (including about fifty color plates and about fifty preliminary sketches), together with commentary on the artist's work by half a dozen major science fiction authors. A good vehicle, it showcases an artist whose balanced and highly polished work can sometimes suffer as a tiny paperback book jacket. It is one of our best bets as a collector's item and, if you are really into it, there is a limited edition for \$30.00 as well as the hardbound version.

Jeffrey Jones, Michael William Kaluta, Barry Windsor-Smith, and Berni Wrightson did the work for *The Studio* (Big O, \$12.50 pb). This collection comprises



paintings, posters, and prints of the primary exponents of the New Romantic School. It is serious fantasy art with careful production values from a group of artists who have self-consciously transcended commercialism.

Last year's big sleeper was a \$25 book called *The Rainbow Goblins* by Count Ulderico Gropplerio di Troppenburg (who was thoughtful enough toward book-buys and reviewers to call himself simply "Ul de Rico"). This year sees a reprint of the book from Warner at \$9.95. It is a fable which is mostly illustrations characterized by the most unexpectedly bright colors dominating otherwise subtle and realistic landscapes. The reprint has very high production values and is calculated to appeal to any age group. Having bought it for yourself last year, you can now take advantage of the less expensive format to give it as a gift.

A publisher in New Jersey by the name of Gerry de la Ree has been specializing for a few years in well-produced hardbound artbooks in black and white. The books are large format and are produced in limited print runs. When they can be found at all, they are in specialty shops, which is where you should check to find out about them. Don't get your hopes up, because the publisher takes advance reservations and can have most of a print run pledged before the books are produced. This year, he

brought out *The Third Book of Virgil Finlay* (\$15.00) which collects interior illustrations of the magazine work of an artist whose ascendancy dates from the 1930s through the 1950s. From the same series are *The Fourth Book of Virgil Finlay* (\$15.50), which is mostly concerned with the artist's career after 1951, and *The Fifth Book of Virgil Finlay* (\$15.75), which is entirely composed of the artist's illustrations from *Weird Tales* Magazine. This year, Gerry de la Ree also produced *More Fantasy by Fabian* (\$15.75), a complement to his previously published edition of the fantasy work of Stephen E. Fabian, an artist highly skilled in black and white illustration.

The Desert Diamond Company in Arizona has published *Cat People and Other Inhabitants of the Outer Regions* (\$9.95 pb) by Karen Kuykendall. We have not seen this work or anything else from either this artist or this publisher, but the book has plenty of cats in it.

A carefully constructed science fiction world can assume the character of a real place in the minds of enthusiastic readers. Robert Holdstock and Malcolm Edwards have assembled ten such *Alien Landscapes* (Pierrot Press, distributed in the U.S. by Mayflower, \$9.95 pb, \$16.95 hb) in a book that combines specially commissioned panoramic paintings with text taken from hypothetical travel brochures, gazetteers, and historical

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treatises. In addition, Holdstock has provided an introduction and a "Galactic Time Chart" which gathers them all into the same universe. These paintings, by members of Young Artists—a studio in London—colorfully depict the worlds of Rama, Arrakis, Trantor, and seven others. The reproduction is superb and this much diversity in the scope of 116 pages makes it a nice package for the SF novice. Bear in mind, however, that many SF fans eschew variety and the book could risk failure as a gift to someone who desires an exhaustive portrait of his own favorite world.

There is an utterly unique art book this season by Wayne Douglas Barlowe and Ian Summers, called *Barlowe's Guide to Extraterrestrials* (Workman, \$7.95 pb, \$15.00 hb). It is a "field guide" to fifty extraterrestrials from an enormous range of SF works and painted with a sort of strict constructionist interpretation. The text describes each of these creatures in terms of physical characteristics, habitat, and culture and accompanies a bird-book type portrait as well as detail pictures (e.g., the puppeteer curling up into a ball when frightened). The quality of the paintings is debatable, but a remarkable variety of creatures is here, done in an enthusiastic way that could make the book a genuine aid to science fiction reading.

The *Space Art Poster Book* (Stackpole Books, \$8.95 pb) was edited by artist Ron Miller. It is an oversize (11 x 16) paperback of twenty-three full color posters of "space frontiers." The selection is a miscellaneous cross-section of previously published SF art: book covers and magazine illustrations. The pages are detachable and suitable for framing. Emphasis is on the art, but the colors are not always good and the selection is sometimes inappropriate for the size or the theme of the book. There was a laudable effort to get new names into publication.

In our studies, we came across about a dozen books which were printed in England and imported to this country for sale on discount tables, sort of like "automatic remainders." They are generally well-produced and handsome and you should not be put off by the low price, other things being equal. *Great Space Battles* (\$6.95 hb) by Stewart Crowley and Charles Herridge and distributed by Book Sales, Inc. is a "Terran Trade Authority Handbook." It is composed of paintings previously published as book covers, assembled in a way purporting to illustrate a future history. The pictures are from Young Artists and are done in the style made famous by Chris Foss. There is a surprising amount of text supplemented by maps and diagrams, which constructs a more or less unified future history to be imposed on a more or less disparate group of illustrations.

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Stewart Crowley has done another "Terran Trade Authority Handbook" which is being distributed by Book Sales, Inc., called *Space Wreck: Ghostships and Derelicts of Space* (\$7.98 hb). We have not seen it, but it is advertised to include three six-page color foldouts.

Still in the discount book class is *Space Wars: Worlds and Weapons* (\$5.95 hb) by Steven Eisler, distributed in this country by Crown. It is a broad range of previously published paintings organized thematically, e.g., "Space Vehicles," "Interplanetary Wars and Weapons," and "Fantastic Creatures." The paintings are reproduced very well and the book is interesting for sometimes having captions (taken from another specious future history) which are at odds with the text, a fairly straightforward and thoughtful description of the background to the illustrations. This is all right, however, because the text is often at odds with the

chapter headings. Nice entertainment for the undisciplined mind.

We have not seen the rest of the books in the discount group. One of them is by Harry Harrison and Malcolm Edwards and is called *Spacecraft in Fact and Fiction* (\$7.98 hb). It includes 150 previously published illustrations. Another, called *Galactic Aliens* (\$6.98 hb) from Outlet Books, by Alan Frank pretends to be a document of alien life forms collected by the "International Agency for Scientific Intelligence." It is illustrated by previously published color pictures and has text written to accommodate the paintings. There are about another half dozen books constructed on this plan of text written to suit previously published illustrations. They follow various themes and inhabit discount tables all over the country.

Among the "personal showcases" of fantasy artists, we must single out Una

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Woodruff's *Inventorum Natura* (Harper and Row, \$19.95 hb). Take the publisher's advertisements of text by Pliny *cum grano salis*, but you still won't be disappointed with this fantastic and unique "natural history." Birds growing out of flowers, two-headed frogs, and leaves turning into insects are some of the subjects depicted in exquisite, Audubon-type detail. These fantastic organisms appear in their "natural" habitats and in terms of their life cycles and, according to the publisher, it is "the only encyclopedia of flora and fauna that supports the theories of non-evolutionists and flat-earthers." It is triumphantly wrong-headed and executed with such care that it must be considered a collector's item. There will be imitators of Woodruff's achievement, but you can safely ignore them. This project could not have been done any better.

The best-selling book *Gnomes* has inspired a series of heavily-illustrated adult fantasy books addressed to a general audience. Last year, Harry N. Abrams, Inc. published the beautiful book *Faeries* by Brian Froud and Alan Lee, which is being reprinted this season in paperback by Bantam (\$9.95). This year, Abrams brings out *Giants* (\$15.95 hb until December 31, 1979, when the price increases), devised by David Larkin. The artwork is original, the book is another exquisite package, and the text is amusing when it is not cute. It often includes genuine folklore, although it is generally tongue in cheek. Any of these books would make nice gifts for people sympathetic to fantasy and well-designed books. They are the brainchildren of Ian and Betty Ballantine and there are more planned, in case you want to begin collecting them.

*The Book of Faeries* (Ballantine, \$8.95 pb, \$15.00 hb) by Beatrice Phillpotts will probably satisfy any serious interest your giftee has in the subject. It includes 65 paintings and illustrations of faeries from 18th and 19th century English artists and descriptive text.

## DRAGON BOOKS

**I**F YOU HAVE been living in a cave and haven't gotten around to your local bookstore this year, then you might be unaware that there is a whole new category of fantasy books abroad in the land: dragon books. We count five, which surely must be enough to say the last word on these creatures. *Dragons* (Viking Studio, a Jonathan James Book, \$16.95 hb) by Peter Hognarth with Val Clery is a collaborative effort by a medievalist and a zoologist. It gives a chronological history of dragons in art, stretching over 4000 years, supporting the artwork with excerpts from contemporary literature. With 150 color reproductions and 50 pictures in



black and white, it is a well-produced package and "feels" much more scholarly than the product of a fad, even a 4000 year-old fad.

There is a dragon book in the discount category also. *The Book of the Dragon* (\$7.98 hb—distributed by Book Sales, Inc.) by Judy Allen and Jeanne Griffiths takes the topical approach to dragon history: Eastern Dragons, Western Dragons, Dragons in Folklore, Dragons in Zoology, and Dragons in Art. There are 140 illustrations with remarkably little overlap with other dragon books, and encompassing large numbers of photographs of dragons on buildings, vases, plates, boats, and any place else you might imagine dragons to be.

Francis Huxley, *The Dragon: Nature of Spirit*. *Spirit of Nature* (Macmillan, \$7.95 pb) is reported to be a scholarly approach to dragons with emphasis on myth and cosmogony at the expense of folklore and colorful detail. From the advertisements, it would seem to be as heavily illustrated as the other dragon books. We have not seen it.

In *The Flight of the Dragons* (\$17.50 hb), Harper and Row has produced a fine package for dragon lovers only. Author Peter Dickinson argues the historical existence of the creatures, presumably for the comfort of fantasy readers who are already convinced of it. The text is lively (Dickinson is a well-known writer in the

fields of mystery and fantasy) and draws on such evidence as the work of Anne McCaffrey, J.R.R. Tolkien, Pliny, Homer, and Gordon Dickson, as well as "biological evidence" and chemical equations. It is profusely illustrated by Wayne Anderson in elaborate and elegant paintings done specifically for this book. You smile a lot while you read it, but the luxuriousness of the execution of this book seems to belie the possibility that Dickinson's argument is just for fun.

One other dragon book we were able to locate is not like the others. *Dragonworld* (Bantam, \$7.95 pb) is a work of fiction by Byron Preiss and J. Michael Reeves with illustrations by Joseph Zucker. It is an oversized (500 page) epic fantasy distinguished by its use of dragons as characters, both heroes and villains.

## REFERENCE BOOKS

**I**F YOU HAVEN'T found anything yet, you might want to consider a reference book. The first group of these comprises books to which you would refer for living in the world of fantasy or science fiction. *The Atlas of Fantasy* (Ballantine, \$8.95 pb) compiled by J.B. Post, is one of a kind collection of literary maps (mostly from fantasy and science fiction), ranging from your classic restaurant napkin map to a completely finished ornamental



cartograph, many prepared by the authors themselves. This book is revised from an earlier publication of Jack Chalker's Mirage Press to include twelve new maps: among them maps for *Dune* and *The Silmarillion*.

Also in this category of reference books is Michael Freeman's *Space Travelers Handbook: An Everyday Guide for the Experienced Astronaut and the Layman Space Traveler* (Sovereign, \$12.95 hb), which is distributed by Simon and Schuster. We haven't seen this book, but it has 310 illustrations in 208 pages as advertised, we admire the publisher for getting so much visual information into such limited space. Approximately half the illustrations are in full color and it otherwise includes "maps, charts, and cutaway drawings of space craft equipment." A great gift for anyone planning a winter holiday on Aldebaran IV.

*A Tolkien Bestiary* (Ballantine, \$19.95 hb) by David Day, "brings together the facts and defines the significance of all the beasts, monsters, races, nations, and deities of Middle Earth and the Undying Lands." It goes into physical appearance, habits, culture, historical evolution, and whatnot. One hundred seventy outstanding illustrations (32 pages in color) in 320 pages.

*Star Trek Spaceflight Chronology* (Walaby, \$8.95) compiled by Fred and Stan Goldstein, is advertised as "a lavishly illustrated history of space flight from its beginnings in the 20th century through the new, refitted pride of the Federation fleet, the U.S.S. Enterprise." It was published in the year 2202, which ought to be excuse enough for us not to have seen it.

*Lovecraft, Providence and Adjacent Parts* (Donald M. Grant, \$10.00) by Henry L.P. Beckwith could help your giftee's appreciation of H.P. Lovecraft. Written by a local historian, it is a guide to the fantasist's home city and the setting of many of his stories. The author is known for his walking tours of Providence at fantasy conventions. There is a frontpiece and maps by David Ireland.

If you are giving to a fan who doesn't particularly want to live there, but just likes to read fantasy and science fiction, you might consider one of the more practical reference books. *The New Tolkien Companion* (St. Martin's, \$14.95 hb), for example, is a concordance of Tolkien's work compiled by J.E.A. Tyler. It has almost 100 pages of new material (to cover *The Silmarillion*) added since the publication of the original *Tolkien Companion* in 1976. The other concordance to Tolkien is *The Complete Guide to Middle Earth from the Hobbit to the Silmarillion* (Ballantine, \$2.95 pb) by Robert Foster. It is a reprint of the revised edition.

There are two scrap books on the *The Galileo Guide*

market this season. *The H.G. Wells Scrapbook* (Clarkson and Potter, \$10.00 hb) is edited by Peter Haining and distributed by Crown. It is a compendium of articles, essays, letters, and memorabilia by and about Wells with 203 black and white illustrations. The Running Press has published *The Tolkien Scrapbook* (\$7.95 pb), compiled by Alida Becker, which is a miscellaneous collection of essays, articles, poems, and songs about Tolkien and Middle Earth. It is all previously published material, but much of it comes from rare and arcane fannish sources. Illustrated by Michael Green, it also includes color paintings from Tim Kirk's Ballantine calendars.

For C.S. Lewis fans, Martha C. Sammons has compiled *A Guide Through Narnia* (Harold Shaw, \$3.95 pb). From the Wheaton Library Series, it is a concordance to the Narnian fantasies.

There is a fairly large subculture

surrounding the Darkover fiction of Marion Zimmer Bradley, as evidenced by clubs, journals, newsletters, and societies devoted to the study of these novels. The people involved in this activity will be glad to see *The Darkover Concordance: A Reader's Guide* (Pennyfarthing Press, \$8.95 pb, \$17.95 hb). It is a copiously illustrated concordance to the series, compiled by the novelist's husband, Walter Breen. It includes genealogies, folklore, and mythology. The publisher promises a quality binding, even in the paperback version.

*Science Fiction: An Illustrated History* (Today Press/Grosset & Dunlap, \$7.95 pb) by Sam J. Lundwall is interesting for adding an opinionated European perspective to its subject. Profusely, if murky, illustrated in black and white, with a few color plates.

James A. Rock & Company has brought out *Who Goes There? Science*

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writers and the established stars.



**Fiction Pseudonym Directory** (\$8.50 pb, \$14.95 hb) by James A. Rock. It is a comprehensive and nicely printed volume with over 12,000 entries. We cannot recommend this edition, however, because of a large number of errors and its tendency to include information extraneous to its presumed purpose.

We were glad to get a copy of *The Science Fiction Encyclopedia* (Doubleday, \$12.95 pb, \$24.95 hb) edited by Peter Nicholls, to use here in the office. It is a real encyclopedia, with 2000 entries and many black and white illustrations. It could never satisfy everybody in a field as disputatious as science fiction, but it is broad in scope and comprises thirty-four contributors as well as five editors. It is somewhat opinionated, but the international coverage is good, it is well written, and it is exhaustive through 1977. Every page testifies to the intelligence with which this encyclopedia was conceived.

**Fantasy Literature: A Core Collection and Reference Guide** (R.R. Bowker, \$14.95 hb), edited by Marshall Tymn, Kenneth J. Zahorski, and Robert S. Boyer, is an annotated bibliography with over 250 entries to the best titles in the field. It lists research aids as well and features an introductory essay to the literature. We have not seen it.

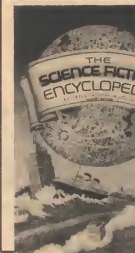
Baird Searles, Martin Last, Beth Meacham, and Michael Franklin are the editors of *A Reader's Guide to Science Fiction* (Avon, \$2.95 pb). They are the staff of the Science Fiction Shop in New York and their book is notable for the way its author entries suggest similar writers for additional reading, something they must do all the time for the customers in their shop ("if you like the work of so-and-so, then you might want to read such-and-such"). It has entries for 200 authors, lists of awards, series listings, and a history of SF.

**The Science Fiction Almanac** (Dutton, \$9.95 pb) by Jeff Rovin is a "Who's Who" for fantasy and science fiction, including monsters, heroes, gnomes, fairies, and all the other denizens of the genre. We have not seen this book, but it claims to have 1000 entries in 288 pages. Judging from the author's previous work, it is likely to emphasize film and popular media.

**The Science Fiction Yearbook** (Starlog, \$4.95 pb) is edited by David Gerrold and compiled by David Truesdale. It is an account of activity in the genre during 1978, including books, magazines, films, awards, art, and personalities. It has essays by Harlan Ellison, Robert Bloch, Fritz Leiber, and others. There are illustrations, many in full color, and the book is 96 pages.

## FILM BOOKS

If the fan for whom you are buying a gift likes science fiction films, 14 GALILEO



there are about fifty books to consider getting. They include books about *Star Trek*, *Star Wars*, *Close Encounters*, *Alien*, *Meteor*, *The Black Hole*, and *Buttler's Galactic*. There is a bewildering array of these things, but they follow a basic pattern. There is a book about the making of the film, complete with stills. Then there is a "photonovel" or "fotonovel," depending on your willingness to abide a certain publisher's abuse of the language, which tells the film story with stills and little speech bubbles like in the comic books. After that, a film can generate scrap books, an "official blueprints" book, and a story book. In addition, *Star Trek* has its own iron-on transfer book, punch-out graphics book, pop-up book, trivia book, and make-a-game book.

Please believe us when we tell you it's for your own good that we don't go through and list all these books. You would find it very boring. And we think it is enough for you to know that there are pop-up books, iron-on transfer books, peel-off graphics books, and so forth for virtually every science fiction film. What we will try to do here is hit the highlights for you.

**The Art of Star Wars** (Ballantine, \$9.95 pb, \$17.95 hb) is edited by Carol Tillemann Wikarska. It documents the making of the motion picture, from preliminary drawings, through story boards, to actual

production paintings. It gives costume sketches and photos of the sets. It includes for the first time anywhere the complete film script by George Lucas.

Lynn Edelman Schnurberger, *The Star Trek Make-Your-Own Costume Book* (Wallaby, \$5.95) is not one we have seen, but it sounded rather intriguing and certainly useful for those who attend a lot of conventions and like to dress up for them.

Charles Lippincott is the compiler of *The Book of Alien* (Heavy Metal, \$7.95). It is a well-done book and it will show you the Alien in poses you didn't see on the screen. You finally have a chance to find out what the creature looks like close up and standing still and you can get a stop-action view of him biting somebody's head off, too. Just the thing for a Christmas gift.

Another Alien book, called simply *Alien*, was edited by Richard J. Anobile. It was published by Avon at \$10.00. It is the most impressive of the film "story books," with truly panoramic photos, comparable in effect to the film itself. The book has to be large enough (8 1/2 x 11) to accommodate such pictures and it manages to tell the whole story. Every word of the dialogue is here, among the more than 1000 color photos.

In addition to books devoted to specific films, there are of course a group of books devoted to science fiction films in

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general. Some of these are critical monographs, but there are a few which are heavily illustrated and presumably a lot of fun to look at. We haven't seen any of them, but they include *Special Effects* (Starlog, \$6.95), by David Hutchinson, which is a full-color album of artist's workshops, miniature landscapes, model creatures, explosions, and other fun. In addition, Starlog has two books from this category in its photo guidebook series. *Science Fiction Weapons: Volume I* (\$3.95), edited by Robin Snelson, covers death rays, killer robots, marauding spaceships, and what-have-you from films and television. *Robots* (\$6.95), edited by Howard Zimmerman, should be self-explanatory.

In the same vein are *Making a Monster: The Creation of Screen Characters by the Great Make-Up Artists* (Crown, \$12.95 hb) by Al Taylor and Sue Roy, which gives an account of science fiction make-up with 700 black and white illustrations; and *Lost Lands, Mythical Kingdoms, and Unknown Worlds* (Heavy Metal, \$6.95 pb) by Val Warren and designed by Michael Gross, collects rare photos, sketches, and stills from the "Golden Age" of *The Blob*, *The Wizard of Oz*, *Dracula*, and others.

#### ILLUSTRATED FICTION

**T**HE CURRENT plethora of visual material on the SF scene has a few elements of novelty, but illustrated fiction has always been with us. Publishers have been drifting toward the replacement of the hardcover book (which no one but libraries is expected to have enough money to buy) with oversize "trade editions," copiously illustrated, sometimes gratuitously and not unoften, shoddily. We are, therefore, cautious in making recommendations for gift buyers in this department.

On the other hand, the existence of a collector's market has made possible the growth of specialty presses which produce well-made and well-conceived books as a labor of love. Our sample includes books from both the mass market and specialty press segments.

Alfred Bester's *The Stars, My Destination* is on many critics' and readers' lists as the "best SF novel ever written." Producer Byron Preiss has devised a two-volume, large format version illustrated by Howard Chaykin, who collaborated with Samuel R. Delany on *Empire* (Baronet, \$8.95 pb, \$15.95 hb, each). Whether or not Chaykin's work is an enhancement to or distraction from Bester's text (which is visually evocative without it) is a matter of personal taste. The fragmented continuity adds a certain cinematic dynamism, but it is questionable whether the human mind is capable of taking in everything on a given page of

this version. At any rate, Volume II probably won't be out until December and if you give somebody half of Bester's story for a gift, maybe you should be shot.

Preiss is also responsible for an adaptation of Theodore Sturgeon's *More Than Human* (Heavy Metal, \$8.95), another classic. The text was cut down a little more in this one than in the Bester. The illustrations are by Alex Nino and are presented in a more conventional way. They are well enough drawn but over-literal and it is doubtful whether they offer sufficient compensation for Sturgeon's missing words (the main attraction, surely).

Jack Vance's *Morreion* (Underwood-Miller, \$20 hb, \$25 signed and numbered) is a short story in a large (9 x 12) format with a "full-color wraparound dust jacket, decorative end pages, a color frontispiece and more than a dozen

interior illustrations," all by Stephen Fabian. *Green Magic: The Fantasy Realms of Jack Vance* (\$15 hb) is a new collection of the author's shorter work, each story illustrated by a different artist, including Fabian, George Barr, and others. We have not seen either of these Jack Vance books, but would recommend them to Vance fans or just admirers of good fantasy.

Donald M. Grant of West Kingston, Rhode Island has been delivering superbly produced books to a discriminating readership for over twenty years. His special limited editions of the works of Robert E. Howard, each with color plates by a different artist, are the delight of the collectors' world, often selling higher than list price virtually instantaneously upon release. The eighth and ninth in this series are *Jewels of Gwahlur* (\$20), illustrated by Dean Morrisey, and *Black Colossus* (\$20), illustrated by Ned

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Dameron. We have not seen these books, but know Donald M. Grant's work and can unreservedly recommend these books as good gifts to be given by anybody who can find them.

Bantam has published a new large-format edition of Ray Bradbury's *The Martian Chronicles* (\$5.95 pb) with illustrations by Ian Miller. It is a handsome job, but as fond as we are of Miller's work (which is as excellent and as individual here as elsewhere), it just doesn't seem to be an appropriate accompaniment to Bradbury's style, with its small-town nostalgia, lyrical horror, and sensual metaphors.

There are also a few illustrated books whose text have not previously appeared. The Brothers Hildebrandt, whom we have encountered above among the art books, made their reputations as illustrators of Tolkien. Now, together with Jerry Nichols, they have written and illustrated their own epic fantasy, *Urshurak* (Bantam, \$8.95 pb). The story to this well-promoted book was developed after the paintings which illustrate it, but it was conceived over a number of years and with a certain amount of care. The vibrant illustrations are undoubtedly the Hildebrandts' best work to date, if the story seems rather usual.

*Planet Story* (Pierrot Publishing, \$10.95 pb, \$19.95 hb—distributed in the U.S. by A & W Visual Library) by Harry Harrison with illustrations by Jim Burns must establish a genre all its own. Measuring 11 x 11 with full-color paintings—many covering two pages—sharing nearly half the book with the text, *Planet Story* is a burlesque of space opera, a broadly satirical extravaganza written for the fun of it. Burns' art is dazzling and should make his reputation: sexy machines, pneumatic females, preposterous but colorful aliens, imaginative detail, both realistic and surreal. We are particularly fond of the war-wolves on pages 106 and 107.

In *Pile: Petals from St. Klaed's Computer* (Pierrot Press, \$7.95 pb—distributed in the U.S. by Holt, Rinehart and Winston), Brian Aldiss has supplied an "allegorical epic" poem as accompaniment to artwork by Mike Wilks. Or was it the other way around? It is a short (36 page) large format (9 x 12) volume with illustrations on every page (four in color). *Pile* is a Candide-like fable of the decadence of a fantastic city-state. The art is non-realistic, somewhat phantasmagorical and crowded with curious detail. Another matter of taste.

One other thing you might want to consider if you've determined to buy a book for a friend, is that there are a couple of publishers which advertise the durability of their products. Gregg Press in Boston does its entire business in reprints, usually of books which have not appeared in hardbound editions before.

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They are not illustrated, but the publisher commissions a special introduction for each and puts it into a durable package including acid-free paper which has a much longer life than regular paper. Gregg Press does most of its business with libraries, but if your friend has a particular favorite book or author, it could be a thoughtful gesture to secure it for him or her in the longest-lasting form possible. Gregg Press has an inventory running well over a hundred titles now. The other publisher which is printing on acid-free paper (specifically for the collector's market in this case) is Underwood-Miller, which we mentioned briefly above. Most of their books are hardbound editions of popular Jack Vance novels. They do, however, publish a number of attractive chapbooks, oblong in shape and well produced. They are short stories with illustrations and this year's offerings include *Nebogipfel at the End of Time* (\$3.50) by Richard Lupoff, *The Bells of Shoredan* (\$4) by Roger Zelazny, and *Green Magic* (\$5) by Jack Vance.

#### OTHER GIFT IDEAS

**S**O YOU ARE still here. There is a fan out there somewhere who is going to get a thoughtful gift this season, judging by how long you have stayed with us. Well, then,

here are some of the possibilities for gift-giving to a fantasy or science fiction fan which go beyond the staple item of fantasy and science fiction books. A gift certificate at a local science fiction bookshop could be well-received. Don't be daunted if the bookshop doesn't advertise gift certificates or if the clerk doesn't know what you're talking about. Just ask for the manager and show him or her some cash. Most science fiction specialty bookstores are independently owned and don't have big corporations behind them and it is very easy to talk them into accepting money, even under the most complex of circumstances.

Records are another gift idea. There are several companies (Caedmon is probably the best known) producing recorded versions of science fiction classics, often read by the authors themselves. There are some records purporting to be science fiction music, but this is a field which is yet in its infancy and if you don't know much about it you might want to wait a while before you risk giving one of those to a friend. If the person you are buying the gift for isn't a friend, don't worry about it. Go ahead and experiment.

A company called Hourglass Productions is marketing taped interviews with science fiction authors. The cassettes are one hour long and feature well-known writers being interviewed by

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other well-known writers. They cost \$4.98 each (plus \$.50 postage) and can be ordered from Hourglass Productions, 10292 Westminster Avenue, Garden Grove, CA 92642. The current inventory includes Katherine Kurtz, Fritz Leiber, Marion Zimmer Bradley, C.L. Moore, Randall Garrett, Gregory Benford, Kathleen Sky, Stephen Goldin, and Isaac Asimov.

Why not give somebody an adult education course in science? Most colleges and universities have basic science courses going on at night (although here you get tangled up with admissions requirements and the like), but you can get a more popular orientation if you enroll in one of the offerings of a science museum or a planetarium. Just call the museum's public information office and they can tell you what courses, if any, the museum conducts. There are also courses in science being offered by libraries and adult education centers.

Posters are rather obvious, but many people don't realize how inexpensively they can possess original art. There are now galleries devoted to science fiction art (Earthlight in Boston, for example), where you can purchase paintings which you have seen on book or magazine covers before. Many of the science fiction conventions feature art shows, where purchases can be made, generally at auction. In addition, if you like the artwork in a particular magazine, you might be surprised at how easily you could buy it. Write to the publisher and ask to be put in touch with the artist of the picture you admire, then write to the artist and make an offer. Don't be shy about it and don't be insulting with your offer and you might just add something to your art collection. For a well known artist, the cost might be prohibitive, but a not-so-well-known artist might be willing to part with a painting for under \$100.

Another nice gift is a membership to the World Science Fiction Convention, which entitles the member to attend the convention over Labor Day weekend, 1980. Even if your giftee is unable to attend, the membership entitles him to receive several convention "progress reports," a handsomely produced program book (complete with original essays by noted authors), and the right to vote for the Hugo Awards. The 1980 convention is in Boston, so if you are local to this city, \$.30 can make a thoughtful gift (write to NOREASCON II, P.O. Box 46, M.I.T. Branch Post Office, Cambridge, MA 02139—the price of the membership increases after December 31, 1979). If you are not local, a trip to Boston with a five-night stay in the Sheraton-Boston to attend this affair is our recommendation as the ultimate in extravagant gifts for the science fiction fan.

—G—

The Galileo Guide

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# Do Apes, Computers, and Extraterrestrial Intelligences Have Rights?

Justin Leiber

*Photographs from the book In the Shadow of Man by Jane van Lawick-Goodall, with photographs by Hugo van Lawick, published by Houghton Mifflin Company. Copyright © 1971 by Hugo and Jane van Lawick-Goodall.*

**I**N SCIENCE fiction, humans rarely run into alien individuals who have a general intelligence as superior to our own as ours is to raccoons and rabbits; aliens whose reasoning is carried on with a depth, subtlety, and speed that would make it totally beyond our comprehension; aliens who might well regard us with as little emotion or respect as that with which human fishermen regard fish. There are exceptions that prove the rule.

E.E. "Doc" Smith's Arisian goodies and Eddorian baddies are supposed to be far more intelligent than we, but, improbably and conveniently, they see us as the key to intergalactic victory in much the way that Tolkien's doughty little Hobbits are the key to the triumph of wise Gandalf and majestic Aragorn over Sauron. How quaint and pre-Copernican!—for why assume we are any more the universe's intellectual center than its spatial center?

Again, in *Childhood's End*, Arthur C. Clarke introduces aliens who triple our I.Q.s. but their hardly enviable role turns out to be that of midwife, for in our transcendence of them we become a god-like group mind. In Robert A. Heinlein's *Have Space Suit Will Travel* three sample humans are examined by the marvelously intelligent and varied species of the galactic civilization. But the distinction between us and them is just temporary. In the long run our species will mature into their level of knowledge and sophistication just as time—and not any biological change—was what was needed to change our ancestors of ten thousand years ago into us. So Heinlein's aliens are not, biologically, our superiors in intelligence, they have just had more experience. Once more: how quaint and chauvinistic! No one would expect that you could get raccoons and rabbits to understand nuclear physics if you gave

them enough time. Why should we assume that centuries will make us the equal of any member of the galactic civilization unless we assume that we are really already their equals in basic biological cognitive endowment?

But these are really not what I am saying you won't find in science fiction. What you won't find are many cases in which the super-intelligent aliens have every right to look down on us as we look down on rabbits and raccoons.

Most of us regard rabbits and raccoons with a mixture of mild affection and not a great deal of interest or respect (if you have some special love for rabbits or raccoons, substitute moose and mice, chickens and crocodiles, or any other set of animals with some basic capacity for understanding, interacting with, or learning from the environment). All things being equal, we won't deliberately cause rabbits or raccoons harm. But if the raccoons are bothering the garbage, the rabbits assaulting the cabbages, if we are hungry—in short, if these animals are in the way of any human interest, then we feel every right to get rid of them. We come first. They have no rights aside from the very minimal right to be free from suffering that serves no reasonable human interest.

There is a good reason we don't find many super-intelligent aliens in science fiction who have every right to look down on us as we on rabbits and raccoons. *We cannot bear the thought of being looked down on by aliens who have every right to do anything they want with us, who would wipe us out if our activity interfered with their slightest interest.* (You might say that the aliens I'm talking about are like gods. But that is not right because what we have called gods are super-human creatures who take a perplexingly exaggerated interest in us. One reason contemporary science makes

traditional belief difficult is that it is hard to understand why an all-powerful and all-knowing creator of this entire universe of galaxies would have the sort of interest in this humdrum planet that traditional religion ascribes to God.)

Let's look at the thought we cannot bear. There are two ways in which we cannot bear a thought. One, the thought is so unpleasant and disturbing that we shut it out. Two, the "thought" is an impossible thought, or a non-thought, like the thought that  $2+2=5$ . I am human enough to hope for the second alternative. That is, I think that it is impossible that even the most super-intelligent aliens would have the right to treat us with no more respect than that which we show to rabbits and raccoons.

If, in short, some super-intelligent creatures did treat us in the way we treat rabbits and raccoons, those creatures would be wrong, they would have no right to act that way. And the reason that they would have no right to act that way is just that we are intelligent individuals. It is not because we are beautiful (perhaps only to humanoids); it is not because of our undistinguished spatial location; it is not because we are made out of hydrocarbons (organisms made out of other chemicals have as much claim to rights); nor can it be just because we are affectionate and feeling creatures. Our claim to galactic personhood, to the right not to be treated as rabbits and raccoons by the super-intelligent, rests on our intelligence—our ability to calculate, imagine and plan for the future, consider alternatives, understand ourselves and others. But once we recognize this, it becomes important to examine the implications of this for our own conduct: above all, it becomes important to keep our hands clean.

Keep our hands clean is a matter of acting, as a species, in such a way that an

Rights



intelligent and objective, non-human observer would think our conduct reasonably fair and civilized. This is a reasonable ideal even if there aren't, in fact, any extraterrestrials to judge us. But if you agree with my thought that the basis of our right to reasonable respect and treatment from powerful and intelligent aliens is our intelligence, than you ought to agree that we have a very practical interest in insuring that such aliens will not feel we have violated the responsibility that intelligence brings. In particular, if we want to claim that other intelligent species should respect our rights because we, too, are an intelligent species, we had better make sure that we ourselves have not violated the rights of intelligent non-human creatures. In brief, the most likely moral rule for the galaxy is respect for intelligent species: we want to be able to appeal to that rule when we meet powerful intelligences and therefore

mammals seem to lack is real intelligence, the ability to understand and appreciate the future, to reason about conduct within relationships. But chimpanzees, orangutans, and gorillas can do all this: their intelligence is demonstrably comparable to our own.

Since July, 1972, Francine Patterson of Stanford University had been teaching the gorilla, Koko, American Sign Language. At this point Koko has a vocabulary of several hundred sign words and can converse in an easy, versatile, and creative way. Ms. Patterson has given Koko yearly Stanford-Binet intelligence tests of the same sort that are used for humans. To her present age of seven years Koko has scored from at low of 84 to a high of 95 on these human intelligence tests. That means that Koko has performed well within the normal human intelligence range. Koko has demonstrated the sort of intelligence that we

albino gorilla, Snowflake, struggling against having a bath, Koko (also a bath-hater) signed, "Me cry there," while pointing at the pictures.

Koko also makes moral evaluations of her own and others' conduct. And she can lie. (See "Conversations with a Gorilla," *National Geographic*, October, 1978.)

Ms. Patterson originally got Koko on loan from the San Francisco Zoo. But the Zoo came to want Koko back, particularly for breeding purposes. In April, 1977, the Zoo gave Patterson ninety days either to pay them \$12,500 for Koko or to give Koko back. Though the case has been settled informally and Patterson still is with Koko, there was a point when it looked like there might be a classic courtroom confrontation between the property rights of the San Francisco Zoo and the rights of an intelligent, non-human creature to freedom and self-determination.

At the time Theodore Meth, attorney and Seaton Hall professor, argued: "The Gorilla doesn't exist any more. Under normal circumstances, the only thing this animal doesn't have that we do is language. Now you have changed it. When you give it the conceptual apparatus for conscious reasoning, for mobilizing thought, you have radically altered it. If it has never been one before, it is an individual now. It has the apparatus for the beginning of a historical sense, for the contemplation of self. Her right to remain in a meaningful relationship with the people she has known is greater than the Zoo's property rights. This is the whole history of jurisprudence over the past 75 years—that property rights must give way to individual rights. In this case you have an ape that has ascended" (*New York Times Magazine*, June 12, 1977.)

This is a good legal argument in that it gives the most conservative and limited reason in Koko's favor. Meth argues that in giving Koko language we have made her into something that we have no right to cage, no right to treat in the way that we treat rabbits and raccoons. Nothing follows from this about other gorillas, chimps, and orangs whether hunted or caged. But Meth's argument flies in the face of what scientists, who work with gorillas and chimps, think.

Duane Rumbaugh, whose chimpanzee, Lana, communicates by punching computer buttons, speaks for such scientists in maintaining that no one who works with such apes thinks that they lack conceptual apparatus (and do no real thinking) until provided a language by humans. Rather, says Rumbaugh, "All we do in these language programs is to agree with them upon a vocabulary." They already possess and exercise cognitive capacities comparable to our own. But that means that each and every gorilla, chimp, and orang behind bars has



Photo credit: Hugo van Lawick

must make sure that we do not ourselves violate the rule.

Are we likely to commit such violations against other intelligent species? Well, I think that there is reasonable evidence that we have already done so, and are likely to do worse unless we give the matter careful thought.

I stated above that we could not base our claim to respectful treatment on the basis that we are affectionate and feeling creatures. My reason for this claim is that rabbits and raccoons—indeed a very large number of animals whom we have displaced from their accustomed territories—are affectionate and feeling creatures. Mammals in general can be recognizably affectionate. We can have a caring relationship with them. Indeed, there is often occasion to think that the mammals we know are rather more reliably friendly and fair-minded to us than we are to them. But what most

consider quite sufficient for a human to be considered a normal, responsible, and functional human being with all the basic rights of a human being; even if Koko make no further improvement in intelligence scores, she is at least a dull normal human in intelligence, as opposed to an idiot or imbecile. (Indeed, there is some cultural bias that has hurt Koko's scores. For example, one Stanford-Binet question pictures a block, an apple, a shoe, a flower, and an ice-cream cone, and asks "Point to the two things that are good to eat." Koko picked the apple and the flower. Koko likes to eat flowers. But that choice cost Koko an intelligence point because the test assumes that "flower" is not a correct answer.)

Koko is also able to articulate complex sympathies. Seeing a horse with a bit in its mouth, Koko signed, "Horse sad." Asked why the horse was sad, she signed "teeth." When shown a photo of the

just as much right to freedom and respect as Koko. Similarly, humans who drive such apes from their accustomed territories or kill them are committing genocide and murder. From the extraterrestrial viewpoint apes have rights in the way we humans have rights, for our claim is based on our intelligence and apes have intelligence comparable to our own. (If you want to maintain that apes have no rights and that neither do dull normal humans, you do have a consistent position but one which will gain little sympathy either from humans or extraterrestrials—what you cannot maintain is the position that dull normal humans but not apes have intelligence and rights.)

We ought to think this matter through carefully. What if aliens land who outstrip us in intelligence and power and who look more like apes than like us? What if they point to our zoos and our casual slaughter of apes? Do we want them to be able to say "tit-for-tat"? Will we feel ourselves fairly treated by extermination of most of us and zoo cages for the remainder? Will we have a leg to stand on if we don't reform our treatment of apes? Perhaps we are well served by Patterson, who, when the confrontation with the San Francisco Zoo was coming to a head, remarked: "This is part of the trauma over my problems with the zoo. To take her away from her family, her environment, to throw her in a zoo cage with a bunch of gorillas—it could kill her. They don't believe it but I do. For myself, it would tear me apart. Of course it would. I'd probably be there in the cage with her."

If the super-intelligence, ape-resembling aliens appear, Patterson's actions might be what shows us to be worth saving from annihilation. I would feel more secure if there were more Pattersons around.

(Success in the practice of teaching apes language began in the 1960s when the Gardeners of the University of Nevada taught the chimpanzee, Washoe, a simplified version of American Sign Language. Most of the work has been with chimps because they are relatively small and quite adroit with their hands. Gorillas, though much larger, are more docile and may be marginally more intelligent. Koko appears manageable at seven in a way that chimps cease to be when their puberty arrives at five-or-so years of age. Orangutans, harder to obtain, appear to have roughly the same intelligence, but no extensive language work has been done with them. What of other mammals? There is little hard evidence aside from brain size that dolphins and whales outstrip ordinary mammal intelligence in the way of apes. Indeed, at least in terms of direct behavioral evidence, we seem more assured that the larger monkeys, such as baboons, stand in intelligence between the ordinary run of mammals and the



Photo credit: Hugo van Lawick

apes and us. Whales, dolphins, and the large monkeys deserve our careful study and consideration.)

What to do about gorillas, chimps, and orangs?

First off, we are going to have to rethink the conditions under which apes are kept in zoos, private collections, and circuses. Anything like the ordinary zoo cage and its contents does not provide an intelligent ape reasonable scope for development and happiness. Again, performing apes—the ever popular chimp particularly—need something like the concern and respect we think performing children should have.

Second, we should try to do something to assure that apes in the wild are protected from murder and deportation and concentration camps. I write "murder," "deportation," and "concentration camps" deliberately; they are the terms that we would use if humans were victims

rather than apes, and I am arguing that apes are deserving of much of the respect we owe to humans. A few years ago some South Americans were charged with murder after they had given deadly poison to a number of Indians whose territory they wanted. They pled innocent in that they had not regarded the Indians as human. In thinking so, these South Americans were following a common pattern among primitive tribal communities: thinking that all non-tribe members are "not human." What is it that makes a tribal community realize that other humans are human, are deserving of fair treatment and respect? In the long run it has been the realization that the alien humans are also intelligent and capable of thought and communication. Our early Stone Age ancestors do not seem to have lived all that differently from chimps and gorillas. An extraterrestrial visitor would not have seen all that much difference

between early Stone Age humans and apes, and such a visitor would likely see no more justice in technologically developed humans pushing around apes than pushing around pre-technological humans.

Some tribal humans have anticipated the problems that may develop out of the recent language experiments with apes. Tribal Africans maintain that apes are humans all right, but humans who refuse to learn language or admit that they have it "for fear that the white man would put them to work." There is already talk of using apes for intellectually undemanding menial labor. What industrialist would not get a gleam in his eye at the thought of strong, non-union laborers with child-like minds and none of the established rights and legal protection afforded the "ungrateful" and "undisciplined" human workers of today? Ah, for the days of lash and chain and no pay checks!

Already small monkeys are being trained to help humans who have drastic physical handicaps. Monkey hands can do much for humans who have no working hands or legs. Such monkeys might seem to have no greater intelligence than the farm animals, dogs, and cats which humans use for eyes, work, food, protection, or amusement and affection. But a well-trained, well-motivated, and well-controlled ape would be much more versatile and useful. The technology is now available so that pleasure- and pain-causing electrodes inserted in a ape's brain could be stimulated at a human's will by a hand-held device.

It would seem vital that we not allow a generation of ape slaves or cyborgs to develop, that we afford apes something like the protection we afford humans. As there is now a recognition that the community must take responsibility for child abuse, so with ape abuse.

Well, what to do positively about the chimps, gorillas, and oranges? That is, given that we recognize them to have the rights of creatures with intelligence comparable to humans, what are we to do in general about them? As with civilized human contact with primitive humans there seem to be two general sorts of answers: (1) reservations; (2) respectful interaction. Though these two alternatives are not mutually exclusive, I want to enter a plea for (2). This for three reasons.

First, reservations have not worked when applied by technologically advanced humans to nomadic and primitive agrarian humans. Inevitably, the interests and activities of surrounding technological humans have pressed in upon the abstract and diffusely decorative principle of non-interference. With starving and landless people the African nation well asks why the concerned of the

United States and Europe should not set aside Nebraska and Denmark as the world's game preserves. Further, reservations have always arisen in a rejection of claims to acceptance and affection by one people on another: white men put the American Indians on reservations with a deliberate, contemptuous, and virtuous sense of superiority—they provided no viable place for American Indians within a joint community. By all means strive for preserves. But don't be too hopeful. There is much to be said for considering alternative (2) more practical.

Second, reservations, upon reflection, seem a product of despair, indifference, and unwillingness to shoulder responsibilities. It is as if we are saying to ourselves that we are unable (and unwilling to take the trouble) to have honorable and mutually worthwhile interactions with non-human intelligences. To the contrary, what Penny Patterson and

Koko appear to show us is that we can (and surely should) have such interactions. It is a small earth and we must learn to live together. And surely there is much benefit to be hoped for in human-ape interaction. I believe that interactions such as those between Patterson and Koko are good and that in general we can tell, and have the responsibility of telling, when such interactions are good. Doubtless it will not be easy to make such judgements, doubtless we will have to strain our brains—but will not extraterrestrial observers be interested above all in our willingness and ability to take on such interrelationships with other intelligent species?

Finally, to recognize the intelligence of apes is to have respect and affection for their personhood. If apes tend to the low range of human intelligence, we surely

[Continued on page 27]

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# Opinion

Robert Silverberg



**S**OME HERETICAL thoughts, a couple of weeks after coming home from the World Science Fiction Convention in Brighton:

Maybe what we have here is too much communication. During the course of four or five days at the convention I was interviewed by BBC Television, BBC Radio, French TV, a British semi-pro magazine, a free-lance contributor to *Galileo*, and assorted others now blurred in my mind. I took part in countless conversations with readers about my writing. I was handed various fanzines containing essays about my work, my alleged philosophical beliefs, my changing career goals, and all sorts of other surprising things. I was asked to sign a gratifying number of copies of my own books, in the course of which I received a good many unsolicited comments about the books I was signing, some of them on the order of "I couldn't figure that one out at all!" and "Say, that one wasn't nearly as depressing as some of the others!" In short, for an entire weekend I was the center of a lot of mad swirling activity wholly and minutely concerned with the career and life of Robert Silverberg. Flattering? Sure. And damaging.

There's no other field of writing in which the writers get so much attention of a direct personal kind from readers and critics. Science fiction sustains an enormous apparatus of conventions, fanzines, correspondence chains, intense critical journals both amateur and academic, and such, all of which bombards the writer with a vigorous and vociferous stream of opinion about his work. Mystery-story writers don't get that. Western-story writers don't get that. Mainstream novelists don't get much of that. What they get are occasional letters from readers, forwarded by publishers or agents, and clippings of their book

reviews. We meet the readers face to face, and meet them again every time we open our morning mail. And we confront them in all sorts of indirect ways—the Hugo voting, the *Locus* poll, and much more, constantly evaluating, assessing, ranking.

There's something heretical in my questioning the benefit of all this, because I've been part of the machinery for most of my life. As a fan many years ago, I wrote scathing critical essays, sent letters of comment to the SF magazines, even put out my own fanzine. I've attended conventions—a couple of dozen Worldcons and I know not how many lesser events. I've made myself accessible to the sort of information flow that descends on the heads of the writers in our field, and I've done it voluntarily. Nobody forces me to go to conventions or to read the fanzines that show up in my mail.

And yet, and yet, and yet, the whole thing is beginning to seem pernicious to me. I find myself wishing I could go to conventions merely to see my friends and talk to my publishers—my prime reasons for attending, anyway—without having to listen to somebody's brilliant analysis of *Tower of Glass* or dumb remarks about *Dying Inside*, without having interviewers coax me into making pretentious statements of belief, without being subjected a thousand times a day to assessment. I begin to think that all that stuff has had negative effects on me throughout my career—so many voices, murmuring away in the back of my skull, offering their conflicting and contradictory demands and needs and opinions and evaluations as I try to get my work done!

I'm an old hand at the world of science fiction peripheralia, and I'm also stubborn, self-contained, and pretty well determined to do things my own way. So I

don't think I've suffered as much as some writers through all this information flow. Yet there's no doubt in my mind that my disillusionment with science fiction writing, circa 1974-78, stemmed in large part from an excess of communication with my readers. A steady barrage of conversations with clucks, boobies, and dodos led me, at a dark time in my life, to conclude that you were *all* like that, and away I went to play in my garden. Would I have written more novels and stories in those four years had I never spoken a word in public about my work? Who knows? But I think it's likely.

Some writers never show themselves in the SF whirl. The man who we knew as "Cordwainer Smith" was unknown at conventions; so is the woman we know as "James Tiptree, Jr." J.G. Ballard hasn't been around very much, nor Philip K. Dick, nor Keith Roberts. Some thrive on the hype and hoopla available in our genre, and some hate it. For most of us—myself included—the effects of all this communication are only transiently destructive; I'm sure Brian Aldiss and Fred Pohl and Harry Harrison and Albie Bester and other old pros go home from the conventions with their heads only moderately swelled from all the attention, and return in short order to the normal pattern of their work and thought. But there are effects, even on them. I'm coming to believe in a kind of Heisenberg law of SF writing that says that if you expose yourself to the storm of information about yourself that can come your way, you're inevitably going to be deflected from your course—probably without even knowing it.

Currently I'm watching the careers of a couple of newer writers who, hitting it big at the start, received first excessive praise and now excessive criticism. They seem to have survived the first nicely enough, and probably will survive the second, although one of them, it seems, is showing some signs of perplexity and strain. I can't help wondering if they'd both have been happier people if they'd simply sent their books floating down the publishing river and waited for their royalty checks in peace—without all that unsettling feedback.

I don't know. I intend to keep on going to conventions and talking to people. At this stage of my life I'm probably beyond much risk of further harm, and I love the fun of it. But I suspect that isolation from the consumers is a wiser course for the beginning science fiction writer. Let him wrestle with his own inner muses and demons, without having to wrestle with thousands of exceedingly articulate readers as well.

—G—

[a post-paid GALILEO envelope is enclosed for convenience]

# Games

Marvin Kaye



**ICE WAR**  
Metagaming

**TRI-NIM**  
WFF 'N Proof

**ALPHA OMEGA**  
Battleline Publications Inc.  
(division of Heritage Models)

**T.E.A.M.M.A.T.E.**  
Logix Enterprises Ltd.

**A**NOTHER fine new game marred by its formidable rulebook is Battleline's *Alpha Omega*, a board game of tactical battle in space. This may well be the ultimate in mimetically convincing spaceship battle simulations and is enthusiastically recommended to all military buffs as well as science fiction game aficionados.

*Alpha Omega* postulates a fascinating history of tri-culture war and alliance in the distant future. Humans representing an Asimovian intergalactic empire are suddenly threatened by bizarre invaders, the Doves (reminiscent of Williamson's *Nowhere Near*, a Legion of Space novella). To combat them properly needs affiliation with another group of aliens, the Rhylish. The diplomatic complications entail Human-Rhylish combat before they both ally against the Doves.

There are many scenarios—virtually “millennia” of war confrontations in space—in the *Alpha Omega* package, and two extremely different spaceship modes: Human/Rhylish that maneuver one way, and Drove, which has different movement capabilities and limits. During combat, the energy potential of each ship must be carefully doled out amongst the various functions of the ship: a finite amount of energy must be allocated for various weapons, protective screens, engines, and so on—a device used in other products, but here employed in much greater detail than I have hereto-

fore encountered.

The components of *Alpha Omega* are chiefly made from heavy cardboard with imprinted designs. The graphics are attractive and play is challenging and engrossing, due to the well-worked-out history of all the scenarios. Like *Star Wars*, one can identify in the best adolescent sense with the “good guys” or choose to cast one’s lot with the incomprehensible villains, the Doves. The only thing wrong with the product is the tediously long and poorly organized rulebook. Really, instructions can be written better!

Metagaming, with its modestly-priced, attractive “microgame” series, is to be commended for producing some of the better-organized rulebooks in the market. Though not perfect, the Metagaming instruction booklet tends to waste less time and words in getting to the point. Sections follow logically most of the time and the style is gratifyingly conversational.

Newly submitted by Metagaming is *Ice War*, a dramatic (even frightening) campaign of the next world war, time circa 2007. The war has been going on for some time and has nearly exhausted both sides. The eastern powers need to end things with one last desperate attack against a U.S. target: polar fuel fields that may be the final and deciding crippling tactic.

The game map represents the ice-fields of the fuel emplacements. The eastern power (player) enters at the top, in the “Arctic Ocean.” The U.S. player mostly deploys about the lower corner of map (Alaska). Since it is a surprise attack, there is a great deal of “blind” movement, and the U.S.—though it has superior satellite missile capacity—is disadvantaged by not knowing where the enemy is for quite some time. Another interesting aspect of the game pattern is that various hexes (terrain) may be voided by fire that converts “ice” to

“water” or perhaps “mud.” *Ice War* is a good introductory game for new war gamers. It is inventive, dramatic and not too hard to learn. Like all Metagaming products, it is very modestly priced. Components are chiefly tiny, cardboard-y counters and a thin map, but for the cost, it is a bargain.

An excellent abstract strategy game from WFF 'N Proof is *Tri-Nim*, in which two players try to out-score each other by clearing a triangular playing board of a greater or lesser number of counters (the number and placement is the option of the players; more counters make game-play tougher). The triangle is divided into hexes with numbers of ascending value. Once one passes a lower stage, one cannot return. As counters get nearer the “out” apexes of the triangle, it becomes strategically more challenging because he who goes through a corner last, scores.

Instructions for this product are simple and terse, but in the same culpable fashion, the firm fails anywhere to define the crucial term, “Nim.” Unless one is a game buff, one can become hopelessly confused as to the object of *Tri-Nim*, which is to finish last.

An interesting concept in computer activity sets has been submitted by Logix Enterprises: *T.E.A.M.M.A.T.E.* (Total Electronic Advanced Microprocessing Maneuvers And Tactics Equipment). With it, one may compose and play back music, doodle electronically, combat the computer in tic-tac-toe and other positional games.

Unfortunately, I have reviewed several samples of this product and all are faulty in operation and not very sturdily made. In principle, *T.E.A.M.M.A.T.E.* is a fine item, but I cannot in all conscience recommend it in its present form. But if Logix improves its performance characteristics, I would be pleased to report accordingly.

*Cosmic Encounter* follow-up: Of all the products reviewed in the past year in these pages, I believe the best to be Eon Products' *Cosmic Encounter*, a game of interplanetary attack and colonization in which each player assumes an alien identity whose varying fantastic powers abrogate different aspects of the basic rules.

Eon has enormously expanded the possibilities of the original game by issuing a series of “*Cosmic Encounter* expansion sets.” Each set contains a new gameboard module and color so the game may be played by more than six (the original maximum tally). In addition, each expansion set includes a great assortment of new alien identities and powers. The possibilities of varied play events thus is terrifically multiplied, with each individual game never precisely the same as any other, either in style, outcome, or requisite tactical genius.

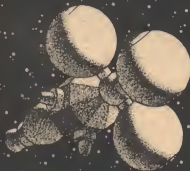


WHO CAN TELL US WITH ANY DEGREE OF CERTAINTY WHETHER THE DRAMA WE ENACT IS COMEDY OR TRAGEDY? DOES AN UNSEEN DIRECTOR STAND BEHIND THE SCENES—OR HAS HE LEFT THE THEATER? IS JUSTIN CASE, 23, MALADJUSTED ASSOCIATE CITIZEN OF AN OVERCROWDED EARTH, THE HERO OF HIS PERSONAL PLAY—OR THE FOOL? WE KNOW THAT LIFE AS AN INDENTURED ASTEROID MINER OFFERED A GLIMMER OF A HAPPY OUTCOME TO JUSTIN—UNTIL THE DAY HIS GOPHER CRASHED ON AN AIRLESS PLANETOID, UNTIL HE DISCOVERED AND IN DESPERATION ACTIVATED THE ALIEN DEVICES THAT HAVE TAKEN HIM.....

# TRUSSWHEEL

by John Kessel and Terry Lee

A TERRIBLE BEAUTY IS BORN IN FREEFALL, IN THE STATE OF EQUILIBRIUM BETWEEN ALL FORCES, AN OBJECT OBEYS THE CLEAN AND IMPERSONAL LAWS OF PHYSICS. A POWERLESS ESCAPE POD FALLS AWAY FROM THE SLUMS OF SPACE. IT DESCRIBES A PRECISE AND BEAUTIFUL LINE UNDER THE FORCES OF INERTIA AND GRAVITATION. INSIDE, JUSTIN AND MARK ARE RUNNING OUT OF AIR. A TERRIBLE BEAUTY IS BORN!



TOTTERING ON THE CHARRED EYELASH OF OBLIVION JUSTIN AND MARK COOLY ASSESS THE SITUATION...

THINKING QUICKLY, MARK RE-CALLS THE BLOWN-HATCH AIR-JET PLOY!

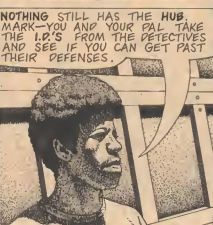
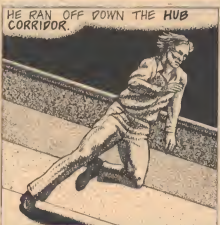
WE'RE GOING TO JUST MISS THE MICROWAVE.



AS THEY BLOW THE POD HATCHES, THE BLAST OF ESCAPING AIR THRUSTS THEM TOWARD THE MICROWAVE!



AT THAT VERY MOMENT, IN POWER STATION CONTROL, A SAVAGE BATTLE IS TAKING PLACE BETWEEN THE DEADBEATS AND THE SECURITY FORCES OF NOTHING, INC. BEFORE THE OCCASIONALLY OBSERVANT EYES OF ACE DETECTIVE SAM BEAUMONT HIS ROBOT SIDEKICK R. DAVID, AND NOTHING EXEC BARCLAY CAVE.



## Rights

[Continued from page 21]

should treat them no worse than we think appropriate for humans in that range. At one time we were content to look away "dulls," "defectives," and "sub-humans." But now we recognize that the most appropriate and loving way with less intelligent humans is to find them a productive and happy place in the heart of the human community, not in a reservation or asylum (unless absolutely unavoidable). Why not the same recognition for apes?

I have been arguing that intelligence (and of course responsible use of intelligence) is what must qualify members of a species for "galactic personhood" or "moral citizenship." Hence I am committed to understanding myself as closer to a green, radially symmetrical, and intelligent Denebian octopoid than to a humanoid-looking creature with the brains of a pigeon. But I am troubled by what now seems to me to be a natural extension of my reasoning. What about computer rights?

I have taken it for granted that we shouldn't be hydrocarbon chauvinists. If aliens have a silicon body chemistry, that does not mean they have any less rights than hydrocarbon organisms. Why should it matter if they are made of metal and electrical circuitry?

You might object that we have created computers (at least the ones around here) and that therefore we have the right to do what we want with them. But this smacks of feudalism. Humans once believed that parents had the right to do anything they wished (including killing) to their creations, that is, their children. We have the right to decide whether to create a child but given that we have produced one we have to treat it as an intelligent, rights-bearing person. Why not so with computers? We already know that we can produce computers that will reproduce themselves, and we already have computers that can simulate nearly any human cognitive capacity and computers that can go far beyond some of our abilities.

Present computers are not programmed, in the manner of HAL of the movie *2001*, to concern themselves with preserving their own existence or reproducing their kind, though even some present-day computers check their circuitry and keep themselves in operating shape. But there is every reason to suppose that we can create computers with such self-consciousness and self-interest; indeed we may have to produce such features when we make (or rather our computers make) umpteenth-generation computers of great power and versatility. There is nothing improbable about HAL. Indeed, several commentators have remarked that the computer HAL is more human than the biological human who

kills HAL. Supposing such HAL-like computers appear, will they not have the sort of claim to respect and rights that we would allow intelligent hydrocarbonians or siliconians? For myself I cannot now see any answer but yes.

Not only are we not alone but we are not alone here. Not only are we not alone but we should not wish to be. Today Koko, tomorrow HAL, sometime the extraterrestrial intelligences. It is an exciting prospect.

—G—

## Editorial

[Continued from page 4]

Magellan. Which is the point to be illuminated.

A part of humanity will move into space, eventually, because this planet is getting crowded and terribly finite. As surely as some people must stay at home, and huddle by the hearth until the last

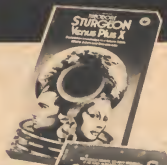
stick of wood is burnt, so others will forsake any degree of comfort for the promise of frontier: new opportunities, clean slates, elbow room.

They will have good reasons for going, reasons that economically justify the effort by the nations or corporations that sponsor them. Energy looks like the strongest bet right now, but it may be something else, such as the production of exotic materials, long-term medical and scientific research, perhaps even permanent political exile. Perhaps war.

But it's interesting to speculate about what these reasons, however compelling they seem now, will look like to historians another five hundred years hence. They may well see them as parochial, trivial, beside-the-point. They may even remember Isabella's concern for the delicate palates of her court, and be amused.

—G—

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# NINE-TENTHS OF THE LAW

Alice Laurence

**D**AN PETRONSKY SAT ALONE in his living room drinking warm champagne from the bottle. The champagne was left over from Polly's going away party and was the only thing left to drink in the house; he wished he'd remembered that earlier.

The house was one of thirty identical houses in a suburban development named "Ridgewoods." The house was small and of no particular style, and was painted white with brown trim. It had cost \$30,500 and was mortgaged to the hilt. The furniture also was of no particular style and it was the sort one knew immediately had been purchased on sale.

Directly in Dan's line of vision as he sat was the Cellini bowl, a great golden curve set with pearls and a magnificent ruby, and signed by the master himself. It had been authenticated by the director of a museum and tentatively appraised as more valuable than the whole of Ridgewoods. It was, in addition to its value, an object of such flawless grace and beauty that no man, however crude and tasteless, could fail to admire it. Dan Petronsky hated the sight of it.

He stood up abruptly and moved his chair so he could no longer see the bowl, but the change was no improvement. Now the telephone was directly before his eyes and he hated the telephone as much, and for the same reasons, as he hated the bowl. It was a perfectly ordinary, black—silent—telephone.

His hatred of it dated to a night a month earlier. He'd been alone in the house when the phone rang. The caller, speaking with an English accent, had called him by name, though he was certain he had no English acquaintances, and had immediately referred to Polar-Power, asking a question no outsider should have been able to ask. In a panic, Dan had hung up.

"Polar-Power" was the popular name given to Ray Jorgensen's brainchild: Ray had discovered a principle which enabled him to release twice the energy while producing half the by-product heat as any conventional means. It was a significant breakthrough. Only five people knew the full scope of his work: Ray himself and his four assistants, Wilma Curtis (who was Mrs. Jorgensen in private life) George Shoemaker, Tom Sullivan, and Dan Petronsky. Ray, typically, called them "partners" and they all knew without doubt that when the day came to distribute earnings, they would be partners, because Ray was that sort of man. But in the meantime, despite the fact that the company was called Petronsky, Inc. (Dan had drawn the short straw when they incorporated), they were assistants. Struggling, hungry assistants who were sworn to secrecy, because Ray was also that sort of man—the sort of man who located his laboratory in the lateral shaft of a very deep mine and then added both lead and reflecting shields to the work

area.

The secrecy had seemed adequate until the Englishman telephoned, asking questions that revealed enough knowledge to phrase the correct queries. Dan had hung up, but the Englishman called back immediately, commenting that they'd been disconnected and repeating his frightening questions.

"I have nothing to say," Dan had said firmly. "Call Ray Jorgensen." That gave them nothing; anyone asking those questions had to know Ray's connection with Polar-Power.

Dan hung up, troubled by more than the obvious implications of the call, though he couldn't quite identify what else upset him. He wished he'd been able to record the conversation and, on impulse, picked up the phone to inquire about having the call traced. The line was dead. After several attempts to get phone service, he got in the car and drove to the phone company's office.

There seemed to be an unusual amount of activity at the phone company, and, after a frustrating hour of going from office to office, he left with the assurance that he couldn't possibly have had the two calls from the Englishman because all service in Ridgewoods had been disrupted for more than two hours.

The obvious thing to do was to tell Ray and let him worry about it, but he didn't. Troubled though he was by the mysterious Englishman, he had a natural reluctance to make a fool of himself. He'd been working long hours recently, he was tired as they all were, he *had* been dozing when the phone rang—he couldn't quite still the doubt that he'd dreamed the whole thing. So he kept silent and waited to see what would happen next.

The next call came a week later. Once again, there was a general phone blackout, followed by enraged complaints from people in the area, but all that did Dan no good. This time, however, he wasn't counting on the phone company to trace the call, and as soon as he heard that damnably patronizing British accent, he switched on a tape recorder.

"Who is this?" Dan asked.

"Names aren't necessary yet," the Englishman replied.

"For who?"

There was a laugh of appreciation. "For us."

"Well, where are you calling from?"

"Oh, my! That's jolly difficult to explain."

"Why?"

"Well, the fact is, old man, that we aren't on your planet."

"You mean you're telephoning from outer space?"

"Outer to whom?" the Englishman said, and Dan laughed.



"Well, where are you from?"

"Well, you know, I can't really tell you. Not to rub it in, but you wouldn't understand, don't you know? And you can't get there, so... We just want a few facts about Polar-Power. Remarkable thing, that. Now—"

"Where did you learn English?" Dan interrupted.

"From the BBC. I'm trained in alien languages, of course. Perfectly fascinating, don't you know?"

"What's fascinating?"

"What languages reveal about a culture, particularly a primitive one. It almost makes me wish I'd stayed in anthropology, instead of switching to physics—"

Alice Laurance

"Who's primitive?"

"You are, old man. Come, come, there's no reason to be sensitive, we all went through it. Cultural adolescence. So trying. I always think."

"Well, by God, we're not so primitive that we don't have something you want pretty badly!"

"So typical," the Englishman sighed.

"What's typical?" Dan roared.

"The confusion of technical advancement with civilization. They aren't the same at all. Ethically, one might say, you were in a stage of pre-puberty. Now about Polar-Power—"

"Wait a minute. Where'd you hear about Polar-Power,

GALILEO 29

anyway?"

"Why from you! There was a story on the BBC." So Ray had been wrong to make that preliminary announcement, Dan thought. "Most rewarding, after all our looking, don't you know?"

"No, I don't know," Dan shouted. "Lousy spies."

"Oh, dear," the Englishman sighed. "Such an unfortunate choice of word, though I suppose it is accurate. Tell me, do your biologists consider it spying to study protozoa?"

"That has nothing to do with it!"

"It's quite relevant, I assure you. Now about Polar-Power—"

"Why do you want to know about it?"

"For obvious reasons."

"Obvious to who?"

"Whom," the Englishman corrected coolly. "To you, I should have thought. We want it for the same reason you do, of course. The problems of heat and energy are universal, don't you know? Not to give you a lecture on cultural anthropology, but when races don't succeed in quite demolishing themselves during adolescence, they usually find themselves with too many... ah... people. Medicine and nutrition and all that, you see. Many of them spread out to vacant systems, of course, but regrettably that option isn't open to us. We require an unusual atmosphere that isn't readily available, more's the pity. We must remain on our own planet, except for crucial scouting missions such as this one. We've managed to solve the problems of food and space, though not without difficulty. I assure you, but don't you see? Heat and energy remain problems. There's nothing we can do about life-heat, but we've had to severely curtail our use of machinery, which is inconvenient. Even cooling devices produce heat. Ironical, isn't it? However, your Polar-Power will solve all that nicely."

"If you're so superior, why don't you produce Polar-Power yourselves?"

"Oh, my dear chap, because we don't function that way, of course. We're technologically eclectic. If you'd reason, you'd see we have to be. We can't tolerate the additional heat experimentation would produce. We seem to have reached a critical point. You see, I'm being completely open with you."

"Open up just a little more. Why us specifically? We can't be the only ones—"

"But you are! Amusing, isn't it? But to the best of our knowledge—and we have searched, believe me—your company is the only one to have perfected Polar-Power. So you see, it has to be you. Furthermore, why else would we risk getting in touch with you?"

"We're almost there," Dan said. "You're in a ship in our system, right?"

"Of course."

"Now let's try it wide open. Why in hell should I tell you anything about Polar-Power when I know you want it for a weapon?"

"A weapon? But I assure you, we don't need destructive devices. We have quite enough of them as it is and, of course, we don't dare use them because of the heat, don't you see—oh! You don't perchance mean to use against you, do you? But how preposterous! Why should we wish to destroy you? We find you quite delightful, old man! Intentions aren't susceptible to proof, of course, so I'm afraid you'll just have to accept my assurances, but we aren't remotely interested in producing a weapon to use against anyone."

"Go to hell!" Dan exploded.

"You're making this needlessly difficult, old chap. We want to be decent—"

"Do you just! How swell! Decent people don't go around making anonymous phone calls, playing practical jokes—"

"—jokes?"

"You don't think I really believe this outer space stuff, do you?"

"But furthermore why should you—oh! Oh, of course, I see."

"What do you see?"

"The essential centrifugal need. Quite typical. But I assure you—"

"I'm not interested in your assurances," Dan said coldly.

"Prove it."

"Oh, very well. We'll be in touch." He disconnected without saying "Cheerio," which surprised Dan.

He waited a moment, then picked up the phone and, as he'd expected, the line was dead. Proof, he thought, and rewound the tape, then settled back to listen. The tape was a perfect reproduction of every word he'd spoken and not one sound uttered by the Englishman. He couldn't take that to Ray; he sounded like a madman. Shaken, he snapped off the machine and tried to reason out the Englishman's motivations. Except for the reference to Polar-Power, the whole thing seemed like a bad joke, but if it was the work of a prankster, how did he learn so much about Ray's work? For a moment he wondered if one of the other three (Wilma was out of it; it wasn't a woman's voice, he was certain) was behind the calls, but he ruled that out as even more fantastic than the idea that the calls came from Mars or someplace as remote. But if some outsider was really serious about wanting information, why confuse the issue with science fiction? It wasn't until two days later that he began to consider the possibility that the Englishman was telling the truth about his origins and what he wanted.



THE PACKAGE ARRIVED by ordinary mail on Saturday and passed unnoticed only because it was his birthday and there were several other parcels.

He stripped the brown paper off carelessly and then jolted to attention. He was holding in his hands what appeared to be a block of metal about the size and shape of a brick, but it was so light, it had required only a single stamp for first class delivery. He stared at it and then holding it as though he expected it to blow up at any moment—the idea occurred to him—he took it into his workshop and put it down carefully on the workbench.

He circled the workbench warily, feeling his anger growing in exact proportion to his confused helplessness. That this had come from the Englishman he didn't doubt, and that the Englishman was an enemy he was equally certain, but he was an enemy completely beyond reach. Dan Petronsky was an intelligent man who believed firmly in dealing with enemies by direct action. He was not a fearless man, but he was a man whom fear spurred to greater strength, and there was no enemy he would refuse to face if it had to be that way. But a voice on the phone denied the possibility of any fight Dan understood, and the situation left him frustrated, angry, and more than a little frightened.

Abruptly, almost in a tantrum, he picked up a hammer and brought it down on the brick with all his considerable strength; the hammer smashed like crockery. He looked incredulously at the bit of handle left in his tingling hand and rubbed his forehead. His fury temporarily spent, he picked up a second, heavier hammer and more deliberately repeated his experiment with the same result. Thoughtfully, he attacked the brick with a file and a drill and, in each case, the brick remained undamaged and the tool was destroyed. At the end of an hour, he admitted defeat.

He lit a cigarette and again circled the workbench studying the still-unmarked brick. Finally resolved to the necessity of seeking outside assistance, he drove one hundred and fifty miles to the university, where he gave the brick to his old chemistry professor and asked for a complete analysis.

Professor Gieger telephoned him the following Wednesday, giving him the report, such as it was. The brick was metallic, but it was not metal known anywhere on Earth; it appeared to be an alloy but its composition defied true analysis. Professor Gieger had been unable to cut or mark it in any way. The Professor asked a number of questions Dan couldn't begin to

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answer, and was far from satisfied with the explanation that Dan had received it through the mail. It was clear he believed Dan had produced the object on brand-new principles.

Dan poured himself a stiff drink and faced the truth. The "Englishman" was quite probably from another planet and very possibly as superior as he claimed. But as long as he was asking questions about Polar-Power, he was still an enemy.

He called a week later.

"Thon here," he said brightly.

"So you do have a name."

"Certainly I have a name. Why shouldn't I? Well, old chap, are you ready to do business?"

"No."

"Didn't you receive our package? What a beastly time I had making the arrangements."

"I got it."

"Well, then!"

"Well then what?" Dan said ominously.

"We've proved who we are!"

"You've proved who you aren't," Dan said and Thon laughed.

"That's jolly good—who we aren't. Quite."

"What you haven't done is give me any reason why I shouldn't just hang up on you."

"Oh? Oh, really? How interesting. But of course. A reason will be forthcoming." This time he did add "Cheerio," before disconnecting.

Three days later the Cellini bowl had arrived. Dan unwrapped it and stared at it in consternation. How in hell had things gotten this mixed up? He'd asked for a reason for not hanging up in an attempt to find out just how far Thon was prepared to go, and found himself in the position of taking a bribe. The ruby glowed richly in its setting, making Dan think of blood.

He hid the package and suggested Polly visit her mother, a suggestion she fell in with quickly. He hastily organized a farewell party for her and had her on the plane before she could ask how he was paying for the trip. Whether she'd be any safer in Santa Fe was problematical, but she couldn't be in worse danger than existed right here.

He took the Cellini to the museum and his worst fears were confirmed; the bowl was not only genuine, it was all but priceless. Dan pressed for an appraisal in dollars and cents and blanched at the answer. He settled down grimly to wait for the inevitable call. He'd been waiting five days and was in a mood to do murder, if only he could find a victim.

He glared at the telephone and as if in answer to his look, it rang. It was Polly, informing him that Mother was fine, Santa Fe was hot, and she missed him. He made an unsuccessful effort to sound natural as they talked.

He hung up and sat down again, wishing for the thousandth time that he'd told Polly Ray, anybody, when the first call had come in. No one would have believed him, but he wouldn't be sitting here alone waiting for that damned English-accent to call. His loneliness was suddenly overwhelming and he remembered another time he'd been terribly alone, a day in Vietnam when an unexpected attack had wiped out his company leaving him the sole survivor.

His recollection was rudely severed by the ringing telephone.

"Thon here," said the familiar voice. "Did you get it?"

"I got it," Dan grunted.

"Lovely, isn't it? Well, to business."

"What business?"

"Polar-Power, of course. My dear fellow, don't be so trying."

"You've still haven't given me a reason for doing business with you."

"But—the bowl!" Thon sputtered.

"The bowl," Dan said heavily. "All right, we'll talk about the bowl. You don't imagine I can keep it, do you?"

"Forevermore, why not?"

"Well, even if I—well, for one thing, there's the little matter of taxes. I couldn't pay the gift tax on that—"

"Good heavens," Thon interrupted, "don't tell me you still have those!"

"Those what?"

"Taxes!"

"Of course we have them," Dan said in exasperation.

"You're more primitive than I imagined," Thon said thoughtfully. "Oh, well, we can easily give you money to pay the taxes. Though you'd probably have to pay a tax on that, too, wouldn't you?"

"Yes, of course."

"Not to worry. It can be worked out. There must be a break-even point. Fortunately, I've laid in a good supply of your currency—"

"Counterfeit," Dan roared.

"Oh, my dear chap," Thon said in a shocked tone. "Whatever do you think of me? Certainly not counterfeit! My supply comes straight from your own mint."

"That's theft!"

"Not at all. What an appalling thought. Though even if it were theft, if you're so careless of possession, why on earth should theft trouble you? For that matter, why should you be so difficult about answering my questions about Polar-Power?"

"What'd you mean, careless?"

"Taxation, of course. Never mind, the question is beyond you. Consider it rhetorical. Really, I'm beginning to enjoy this. Your attitudes are positively quaint."

"Quaint-smaint," Dan said. "Anyway, when I asked why I should do business with you, I didn't mean something like the bowl."

"What did you mean?"

Dan hesitated, not exactly sure what his meaning had been. "Well—for Earth. You want to take something from Earth—what will you give in return? The bowl was here all along."

"Was it? Perhaps I made it."

"Then it's nothing!"

"Nothing?"

"If Cellini made it, it's valuable but it was here all the time. If it wasn't here all the time, Cellini didn't make it, so it's worthless."

"But, my good man, if it's lovely, what difference does it make who made it?"

"It's either a Cellini or it isn't," Dan said stubbornly.

"A logician?" Thon said. "Admirable!"

"The bowl isn't enough," Dan said. "Well?"

"Is your life enough," Thon said coldly, all humor gone from his voice.

"I figured you'd get around to threats pretty soon. You talk about ethics—"

"What on earth do ethics have to do with it?"

"I thought you said ethics make up a civilization—"

"Ethics are the hallmark of civilized beings, certainly. But in this situation, they are irrelevant. In dealing with non-civilized beings... well, my good fellow don't you step on ants? Ethics don't apply here. You give us no alternative, you appear to understand nothing but threats. Our need for Polar-Power is quite pressing. I assure you, we'd have no hesitation about... ah... stepping on you."

"Stepping on me," Dan repeated bitterly. "All right, step. I suppose if you can make telephone calls and mail packages from wherever you are, you can figure out some way to attack me, too. But I'll tell you this, buster, you'd better be ready for a fight!"

"You mean you actually refuse to answer my questions," Thon said in amazement.

"You bet your ass that's what I mean. You can go to hell!"

"You're being very foolish," Thon said severely. "You aren't the only one who can provide the information. Others possess it, I assure you, we'll get it from them if you refuse."

[Continued on page 35]



# EAT YOUR HEART OUT, GLORIA MARSHALL

Ray Ellis



**A**T BREAKFAST EXACTLY one year ago today I stood up at the head of the table, tapped my orange juice glass with a spoon to get the attention of my family, and made the following speech:

"If I have to go on a diet, then everyone else is, too."

I sat down and gauged their reaction. Helen, my wife who has a figure like those fashion drawings in the newspaper, just smiled. Deronda, my seventeen-year-old daughter who stretches the legs of her non-preshrunk jeans by pushing a broomstick through them, simply ignored me. My son James speared a fried egg and downed it in one gulp.

*This is how much respect a fat man gets in his own home.*

Oh well, as the saying goes, actions speak louder than words. Things are, of course, different now. But more about that later.

Right now, though, I'd like to tell you that one year ago today I was obese. Yes, obese. That's *the* word. Not robust. Not pleasingly plump. Not big-boned or large-framed. *Obese*. Fat is fat and that is that.

Fat is lipid. Fat is adipose tissue. Fat is the Triglycerides of Stearic  $[\text{CH}_3(\text{CH}_2)_{16}\text{COOH}]$ , Palmitic  $[\text{CH}_3(\text{CH}_2)_{14}\text{COOH}]$ , and Oleic  $[\text{CH}_3(\text{CH}_2)_7\text{COOH}]$  acids.

Believe me. I know. I'm a biochemist.

Fat is also unhealthy, unesthetic, and decidedly unsexy.

Fat is what I didn't want to be anymore. I was fed up. So I went to see my family doctor.

He wanted to rule out any organic cause for my obesity, so he checked me into the hospital and ran a battery of tests. We ruled out hyperthyroidism, adrenal hyperfunction, adiposogenital syndrome, Dercum's disease, Cushing's disease, myxedema, avitaminosis, edema, salt retention, and heredity.

My doctor proudly proclaimed that I had no organic reason for being obese, so he sent me to see a friend of his who just happened to be a psychiatrist.

On the couch we ruled out latent masochistic tendencies, hatred of my mother and/or father, lack of positive self-image,

Cortney Shinek



neurosis, boredom, loneliness, annoyance, jealousy, anger, guilt, depression, anxiety, tension, need for a reward, emotional fatigue, eating to spite my wife or parents, and last but not least, sublimation of the sexual urge. In short, there was no psychological reason for my obesity.

So back to the family doctor. He stroked his beard as he pondered the mysteries of obesity and said that my excess poundage must be the result of my eating too much.

Great! I was nearly a thousand dollars in the hole and he said I was fat because I ate too much! The wonders of modern medicine never cease to amaze me.

He put me on a diet. I'll spare you all the boring details, so let's just say that it didn't work. Still, I wasn't discouraged because I remembered reading somewhere that there is no one diet that will work for everyone. I figured I'd just have to find a diet plan that suited *me*.

I tried Weight Watchers. I watched my weight all right. Watched it stay the same.

I tried methyl cellulose, which is supposed to raise your blood sugar level so you don't feel hungry. But the more energy I had the more energy I put toward eating.

I tried fasting. Oh, I lost weight all right, but put it right back on after the fast.

A high fiber diet gave me diarrhea.

Liquid protein gave me constipation.

A banana and bagel diet made me horny.

Diet pills had me climbing the walls and ruined my concentration at work.

A water diet also ruined my concentration, but for a different reason.

I tried eating slowly, which meant it took me longer not to lose weight.

I tried eating while standing up and got swollen ankles.

I tried chewing gum, but always ended up swallowing it and then popping more in my mouth.

I would have tried chewing tobacco but I was afraid I'd swallow it, too.

I even tried behavioral modification where they zap you with an electric shock every time you pick up a fork. I developed a paranoiac fear of forks. I didn't lose any weight: I simply learned how to eat without using a fork.

In short, I was a dietary failure.

Overwhelmed by this fact I decided to give up. If the good Lord wanted me to be fat, I thought, who was I to go against His will? (Looking back on it I realize this was a rationalization, because I have never been a particularly religious person. But, you see, I was clutching at straws.)

At any rate, I decided to submerge myself in my work at Dow Chemical. The first thing I did when I got to the lab was stop at the cafeteria and buy a doughnut and coffee.

I tried to clear my head of all the cobwebs, something I do before starting on any new chemical project, but I just couldn't get my mind off the overweight problem.

Then as I was reaching for the coffee I noticed a fly on the rim of my cup. Damn flies, I thought. You would think a laboratory that makes insecticides could at least keep the flies out of its own cafeteria.

I was about to shoo the fly away when I began to wonder. Do flies ever get hungry? This might sound kind of weird if you know nothing about flies. Being a biochemist who is charged with finding out new and better ways of killing off the little buggers, I have to know something about the beasts in order to do my job well.

The reason I wondered is because hunger is a complex feedback mechanism that relies upon a rather sophisticated nervous system. But a fly's nervous system is too simple for that. Instead, they have on their feet and legs hairlike structures called tarsal sensilla. At the end of each sensillum is a contact chemoreceptor that responds to certain chemicals. If they tell the fly there is sugar underfoot, it extends its proboscis and feeds. If not, the fly goes elsewhere. So, strictly

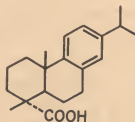
speaking... flies are never hungry.

Suddenly an idea hit me like a ton of bricks falling on a bunion. In one fell swoop the solution to my problem was laid out before me in magnificent simplicity.

But it was only a theory. First, I had to comb the research and then conduct experiments.

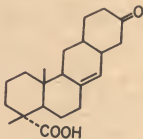
I remembered an article in *Science* a few years back about sawflies and looked it up. I found it on microfilm in the company library. It was about Diprionid sawflies who would deposit their eggs only on the branches of mature Jack pines. The researchers wondered why the flies didn't deposit their eggs on juvenile pines as well.

They found out that the juvenile Jack pines had a substance in them that mature pines lacked. Structurally the substance looks like this:



It's a fairly typical resin acid in pines and goes by the name of dehydroabietic acid.

There was nothing particularly astounding about this. Resin acids were known to be used by several trees to ward off harmful insects. But the researchers also isolated a substance that structurally looks like this:



This, too, is a resin acid. Nobody, however, had ever seen the likes of it before. The researchers weren't even interested enough in it to give it a name. They simply called it Compound A. I guess they figured a resin acid is a resin acid and left it at that.

There was something very strange about this compound, though. I couldn't quite figure it out. I tried to continue with the research but couldn't concentrate. My mind kept coming back to the structure of Compound A. It just didn't fit neatly into the known pattern of typical resin acids. Whenever I get this way there's only one thing to do about it: experiment.

I managed to get some juvenile Jack pine sprigs and proceeded to extract and separate both Compound A and dehydroabietic acid.

I wanted to know which substance was more effective at preventing the sawflies from depositing their eggs. The experiment was conducted and I found out that both of them were almost 100% effective.

I was still convinced that Compound A was no ordinary resin acid. To find out why, I needed to know exactly how this compound prevented the fly from laying her eggs and to see if this was any different from the way dehydroabietic acid prevented it. In order to know that I had to understand how the

**EAT YOUR HEART OUT**

chemoreceptors in the fly's sensilla responded chemically to the compound.

Ordinarily a resin acid acts as a repellent. The fly recognizes the acid as a toxic substance and flies off. It's a sort of a brute force way for plants to protect themselves. But there is another way.

Morning glories, for instance, protect their seeds with an alkaloid called D-isosylsergic acid amide, a substance related to LSD-25. After all, it takes a lot of poison to kill an insect outright. If only a few molecules of a psychoactive drug will make the bug go off and try to mate with an elk, well then, all the better. And if you don't mind an extraneous comment here, I think this more refined method is not only more effective, but more beautiful.

Experiment showed, however, that Compound A was not a repellent. A repellent interacts with the chemoreceptors by depolarizing the membrane of the exposed dendrite. This creates an electrical impulse that is interpreted by the insect's nervous system as "Bad food. Do not eat."

However, with the use of microelectrodes I determined that when the chemoreceptors of a fly came into contact with Compound A there was no depolarization of the dendrite's membrane. Which means no electrical impulse. And if there is no impulse, the fly doesn't recognize the substance to be bad food, good food, or anything at all for that matter. And if the fly doesn't recognize what it has landed on as good food, it's not going to feed or lay its eggs. And since Compound A wasn't a hallucinogen either, there was only one other explanation. Excited as I was about this I still needed to do one more experiment to be doubly sure.

I trapped some ordinary house flies and put them in an enclosed aquarium. I also put in a petri dish which had a sugar solution with Compound A added. I also made up a control tank with just a sugar solution in the petri dish. Then I sat back and waited. Within three days the mortality rate in the experimental tank was 100%. Whereas the mortality rate in the control tank was within statistical norms. Mind you, the solution in the experimental tank was perfectly good as a food source. It's just that none of the flies recognized it as such because of the inhibiting effect of Compound A. I had to smile at the beautiful irony of the experiment. Amid a plentiful food supply, the flies died of starvation.

We scientists have a technical name for a result like this. We call it a *B\*RE\*A\*K\*T\*H\*O\*U\*G\*H!*

After publishing the finding, everything seemed to go at the speed of light.

I developed an easy method of synthesizing Compound A (I renamed it Eating Reflex Suppressor), which uses cheap base chemicals and the company took out a patent.

I did more research and found out that ERS worked on all insects that use contact chemoreceptors to recognize food (which is nearly all of them).

And what's more, field tests proved that there were no adverse environmental effects. After all, it didn't actually kill the insects, it simply made them go elsewhere to find food. It also didn't affect insects whose intent was pollination.

The only thing I had to falsify were the laboratory animal tests with ERS-treated grain.

Luckily the Department of Agriculture didn't conduct its own tests because of pressure from both farmers and environmentalists (who for once were on the same side) to get ERS on line as soon as possible, especially since the adverse health and environmental effects of other pesticides were becoming painfully apparent.

It was cleared for use that spring. If there were any doubts about its effectiveness or safety before that, you would never have guessed; everyone was proclaiming that man had won a distinct victory over Good Old Mother Nature.

That autumn the harvest and the farmers' profits hit all-time highs. The price of food plummeted. Millions of tons of food stuffs had either to be stockpiled or sold at bargain prices

Ray Ellis/Alice Laurance

overseas. In fact there was so much surplus grain that several large oil companies bought up lots of farmland with the idea of distilling alcohol for use as a fuel.

As the inventor of all this good fortune, I became somewhat of a celebrity. I was even a guest on a few national TV talk shows. I began to think of myself as the Carl Sagan of the chemical world.

Can you believe I hardly noticed all that? I was looking for something else, and not until midwinter did I see the first sign of success. A survey in *Newsweek* suggested that the percentage of overweight persons in the United States had dropped significantly. The article's author thought that this might be due to a sampling error of three percent. I knew better!

Things started to pick up rather quickly after that. A few weeks later I read a newspaper account of the unexplained weight loss of millions of obese people. People who had never been able to stick to a diet suddenly found the will power (?) to say "No" to second helpings. And most important, even yours truly was beginning to shape up.

But the thing that amused me the most was that damn near everyone with a book, figure salon, or exercise program took credit for the sudden national urge to good health. Gloria Marshall even made a TV commercial suggesting *she* was responsible (no doubt in a last ditch effort to beef up her sagging profits). All this just made me smile. I, of course, knew better.

I suppose one of these days I'll have to tell them. That is, if they don't figure it out for themselves. I suppose one of these days I'll have to release the real findings of my laboratory animal tests. I suppose one of these days when I'm the guest on the Today, Tonight, or Tomorrow Show I'll stand up, tap my glass, and say what I said to my own family exactly one year ago today:

"If I have to go on a diet, then *everyone* else is, too."

—G—

## NINE-TENTHS OF THE LAW

[Continued from page 31]

Now do be sensible. Why should you subject yourself to unpleasantness—"

"Maybe you will get it," Dan said slowly. "I can't do anything about that. But Polar-power isn't mine and you won't get any information from me, no matter what you do to me!" He couldn't fight an unseen voice, but defiance at least was left.

There was a gasp and then speaking faintly Thon said, "What did you say?"

"I said I don't care what you do to—"

"No," the Englishman said sharply. "Before that."

"I said Polar-Power isn't mine and I won't be the one to tell you," Dan repeated angrily.

"But my dear chap, if you understand that principle you can't be...oh, my dear chap," Thon said, "my dear chap, forgive me! I assure you, we had no idea...not the slightest hint! We shan't trouble you again."

"You mean you don't want Polar-Power?" Dan said in astonishment.

"Oh, my good man, we want it desperately. I might say it's a question of survival. But, well now, well, I'll have to find another way of doing business. Good heavens, what a *gaffe*. Whatever do you think of me?" He rang off in a verbal blush.

Ray Jorgensen sold the extra-terran rights to Polar-Power for a price that caused the Department of Internal Revenue to ask some very difficult questions. In addition to the money, he received something that might have been a genuine Rodin. Or it might not have been, but it was magnificent in any case, which was all that concerned Ray.

Dan Petronsky spent the rest of his life wondering what on earth he'd said.

—G—

# PASSAGE TO EARTH

Leanne Frahm

**V**ELDA ROLLED ACROSS the plush blue-grey fur and sat on the edge of the pallet, rubbing at the trickle of perspiration between her breasts. It stung where his bristles had scraped her skin. She glanced over her shoulder at him. He lay face down, breathing heavily; sweat glistened on his body in the dim glow of the fading lightstrip.

She grimaced, rose, and went into the tiny cubicle behind the grimy curtains where the bowl and towel were kept. The water gave off a curdled chemical aroma. She craned her neck down to examine the scratches—not too bad, they shouldn't infect. Dirty rough sod. The rough ones were always dirty, coming off their tramp freighters randy and stinking, not having bathed for weeks. Still, it was rare to get a crewman, and he had talked, briefly. He had talked about Earth.

Earth... It was spring somewhere on Earth. Right now, while she stood tied to the surface of grubby little Mining World Proxima XIV, it was spring somewhere on Earth.

She sighed, and stuck her head round the curtain, glancing at the digital. "It's after three," she said shortly. "You'd better go."

He grunted and sat up. She watched him without interest as she towelled herself. Once she had found it hard to look at them afterwards. Now she could look without seeing anything.

He stood up and hitched his pants into place, pressing the seams carelessly together. Velda slipped her robe on and came back into the room. For a moment he watched her walk, scratching absently at the tangle of black hairs above his bulging stomach. She glanced at him and caught the look.

"That'll do," she said curtly. "Out."

He took his jacket from the back of the room's single chair and swung it over one shoulder. "Starship Engineer Cl. 3" glinted dully on the epaulette insignia.

"See you again," he said. "Real soon. You aren't planning on going anywhere, are you? Like maybe to that Earth you're so crazy about?" The smile became a grin as the door slid back,

grating over sand in the track. He pushed it the final few inches and stepped out. The gears hummed feebly for a moment before it jerked itself shut.

Velda stood looking after him, fists clenched. Then she relaxed slowly. No, she wouldn't be going anywhere. She took a deep breath and flicked the intercom switch on the wall.

"Anyone else, Ethel?" she asked.

"No one waiting," the voice crackled from the tiny speaker.

"Call it a night, Velda."

Velda switched off, picturing Ethel sitting hunched at his desk in the brothel's introroom, ticking off the customers, lines deepening in his little monkey face as he counted the money, cudgelling his brain for new and more extreme ways to attract trade. She wondered if she should complain about the Engineer. Ethel would whine. Velda didn't feel up to Ethel's whining tonight.

"To hell with it," she muttered.

She pulled the fur off the pallet, and folded it gently. The rare protocat skin from 61 Cygni V was the result of one of Ethel's vague attempts to provide luxury service. It was for the guests' use only, not the staff's.

She stretched, and moved to the strip-switch. The thin light winked out as she pushed it. She slipped her robe off and walked to the window where the night wind fluttered the faded red flowers of the curtain. Nights at least were cool on New Isa. The changing moonlight lit the low huddle of buildings, now blue, now white, as thin clouds crossed one or other of the moons. Velda liked the soft night light. It felt clean. She breathed the air which carried the scent of night-flowering cacti. A night rodent slithered through the sand. A gust of laughter from the hotel across the street died as suddenly as it had begun, and the night silences crowded in again.

But tonight Velda did not feel soothed by the peace. She felt edgy, her nerves tingled. Perhaps it was the Engineer and his talk of Earth. Perhaps it was his parting jibe...

PASSAGE TO EARTH





—Mummy, it's too hot here. I don't like this place. Why did we have to leave Earth?—

—It's a good job for daddy, Velda. He can make lots of money in the mines. Never mind, darling, we won't be here for too long—

The memory startled her. She hadn't thought of her mother for a long time, or of her childhood. The Great Explosion, they had called it, the generation-long migration of millions of workers and their families to the mining systems or the grain worlds. She had been caught up in it, leaving an Earth sighing with relief from the centuries-long struggle with overpopulation. Then the clamp-down, when space fares soared astronomically in more ways than one, ensuring that the migrants stayed put.

She shivered, crossed to the double pallet on the floor and lay down. A faint humming became a prolonged heavy vibration as a mining-mole tunnelled through the ore beds far beneath her, but she resolutely closed her eyes, enjoying for a moment the luxury of inactivity, and soon slept.

Robbie sat curled up in one of the introroom's cushions, vainly trying to coax some shape out of her bitten nails with a bent and rusty nail-file. Conrad stood by a shelf, idly polishing the pieces of crystal and quartz caded from his clients who brought them to him from all the known systems. The hot summer sun streamed through the thin curtains, creating a heat that the ancient coolair unit in the corner could not control.

Ethel sat at his desk—a luxurious piece of furniture on a desert planet where wood was scarce—checking the manifests. The next supply ship would be in soon, and he was determined the tally clerk wouldn't cheat on his quotas again.

He squinted up at Velda as she came into the room, and sat up purposefully.

"Velda," he said sharply, "I want to talk to you."

Velda looked down at his spindly figure. His deeply etched face parodied a look of businesslike decisiveness. She sighed.

"Yes, Ethel," she said.

"A customer complained about you last night," he began. "Said you weren't very friendly."

Robbie and Conrad woke from whatever daydreams held them and listened attentively.

"He got what he paid for," Velda said indifferently.

"That isn't always enough," Ethel pointed out. "We get our customers because we offer more than those automism machines the companies give 'em. If you don't make it pleasant, we're going to lose crewmen and miners."

Velda bit her lip. "I can't help it, Ethel," she said. "Sometimes I just don't feel like it."

"Listen to her!" sneered Conrad. "Who does?"

"Yes, what's so special about you?" Robbie flared.

"Oh, shut up, you androgynous—thing!" Velda snapped.

Robbie immediately began to cry noisily, and Ethel hurried to her defence. Robbie's surgical embellishments had been, naturally, his idea. "That's not fair, Velda," he said, his voice rising. "Robbie is our best showpiece, and she's still as human as you are. And a lot more useful!"

"That's right," Robbie blubbered. "We do our best to keep them happy, but if you start getting fussy, we'll all be out of work and then what will happen to us?"

"Something better than this, maybe," Velda shouted at them.

Velda stared at her, wide-eyed, tears forgotten. Conrad fiddled with a rock. Ethel sat rubbing at his bristles, unsure of how to handle her sudden vehemence.

"Something better than this," Velda said again, her voice a whisper.

"Something like Earth?" Conrad broke cattily into the silence. "There's no need to rub our noses in it, darling. We know we're here for life."

Ethel cleared his throat, adam's apple bobbing, trying to

regain control of the situation. "Now you know, Velda," he said, "I run a fair, clean establishment." He looked round hopefully for support. Conrad made a choking noise. Ethel ignored him. "I don't play favorites. It's too important for me to have a happy bunch of workers in a happy house. I know the work gets rough sometimes, but let's face it, that's the way things are, and I can't do anything about it." His voice became cajoling. "At least you've got a job, and a chance to save while you're here, maybe even enough for a passage to Earth, in spite of what Conrad says. You ought to be grateful, make the best of it while you're still young."

"And no more squabbling."

He bent over his lists again with the air of a successful arbitrator. Robbie flopped back to her cushion, her round face surly. Conrad went back to his crystals. Velda stood for a moment. Something in Ethel's pinched expression reminded her of another lined face, a child's querulous voice.

—Mummy, when is daddy coming back? I want to go back to Earth.—

The worn face cried silently. —He's not coming back, dear. We can't go back for a while.—

Velda went mechanically to her room and lay thinking. She thought of the sweat and the dust of day, of the baking, unbroken desert that stretched endlessly treeless under the glare of the young sun; of the dry storms whose low pressure spirals left her faint and gasping for oxygen; of the dustclouds on the horizon, red against the yellow sky, signalling a miners' convoy; of the raucous eruption of pay-day, and the hot-metal smell of the men pressed around in a bellowing, pawing celebration.

Her life. From the day her mother had died, she had been passed around the women of the township. Then Ethel had pounced. The mines had been unkind to Ethel, or Ronald, as he had been then; he had withered quickly there as so many others had. But unlike the others he had decided to do something about it. He had seen Velda as the nucleus on which to build a thriving industry servicing the mining camps. The name-change had been the first of his bizarre attempts to promote the business. Velda had accepted everything, had taken each day and lived it as it came.

But now an emptiness loomed, gnawing at her consciousness. She saw the contours of her life in the dunes of the desert—harsh, monotonous, unstimulating, barren. She heard the voice of a young child weeping for Earth.

A child on Earth. To go back and re-live that time. If only she could...

Velda was unaccustomed to introspection. She lay thinking until the evening brought her first customer.

**T**HE 'WINTER' MONTHS DROPPED the temperature of New Isa only a few degrees. The desert was hot and ugly in the afternoon glare. Velda kicked at the dust as she trudged towards the brothel, and the fine particles hung in the motionless air, metal-smelling, covering her legs and skirt.

Ethel was in the introroom, busily sweeping the day's dust back outside in readiness for the evening callers. The building was fitted with extraction filters, but Ethel never used them, preferring to use the broom and save money on the power bill. He looked up as Velda entered.

"You look pale," he said fussily. "You ought to wear a hat outside."

Velda pushed ineffectually at the damp strands of hair on her forehead. "Ethel, have you got a minute?"

"Go ahead. I won't stop, I want to get this done."

Velda sat carefully on a cushion, rubbing the dust off the back of her skirt first. "I've been to the doctor, Ethel, and he's pretty sure I'm pregnant."

Ethel dropped the broom handle across the desk and turned on her. "How the hell did that happen?"

Velda looked down at her hands in her lap. "I don't know."

PASSAGE TO EARTH

There was that crew from the freighter a couple of months ago—you remember, the ones who got licked by a flare? Everyone said they were safe, not to worry. Maybe it made me careless, I don't know..." Her voice trailed into nothing under Ethel's disbelieving stare.

He put his gnarled hands on his hips and bent over her. "That's not true. You would've known the first week, not a couple of months' later." His voice took on a plaintive note. "You've done this deliberately, just to spite me, I suppose. Well, you can get straight back over to the doctor and get rid of it."

Velda stared at the floor matting. Tiny sand-roaches hopped from crevice to crevice. "Yes, I suppose so," she said.

"What do you mean 'suppose'?" Ethel asked angrily. "What else are you going to do with it?"

"Do with what?" asked Robbie curiously, coming into the room from the kitchen.

Ethel snorted. "Velda's pregnant, that's what," he said. "Why?" asked Robbie wonderingly, her moon face becoming rounder with surprise.

Velda looked at them, from the wrinkled angry face to the fat shining one. It struck her with sudden conviction how much she hated them both. And Conrad. And the miners and the whole damned planet. She nursed the remainder of her plan to herself. It gave her courage.

"I'll go tomorrow," she said, rising. "I'd like to lie down for a while."

Ethel watched her go, then picked up the broom and went back to flicking at the elusive dust and the more elusive roaches. He shook his head, feeling old and discouraged. All he ever asked was co-operation... The roaches leapt for cover from his suddenly angry attack.

Robbie staggered into the kitchen, and propped herself in the door opening.

"That was one hell of a night," she said to Conrad, who stood, a wet mug in his hand, trying to thump some warm air out of the blow-drier.

"Well, you enjoyed it while it was happening," he pointed out nastily. He gave up on the drier, and squirted instant tea into the pool of cold water at the bottom of the mug.

Robbie slowly moved four feet to lean against the sink, searching for a cigarette in the cluttered pockets of her robe. "Hey, you heard about Velda?" she asked, picking up the kitchen's lighter.

"Yes," said Conrad. "What do you think about it?" Robbie prompted. She inhaled and coughed violently.

"What do you expect me to think?" asked Conrad. "My mind doesn't work like a woman's."

"Hal!" said Robbie. "Go on."

Conrad poured hot water into his mug, deliberating. "She's stupid," he said finally.

"I think so, too. She ought to get rid of it. This is no place for a kid. She's a bloody little fool," said Robbie, wiping the tears from her eyes with a shaky hand.

"Velda!" Ethel's fury carried him through the opening almost before the door could respond and into the middle of the room. Velda turned from the window and faced him.

"I heard the others talking," he began grimly. "They say you won't go to a doctor. Is that true?"

Velda dropped her eyes. "Yes," she muttered.

"Listen, if you've got any ideas about keeping a brat around here, forget them right now! I've got a business to run, and I won't have you off work, whether it's because you're too fat or whether it's because you have a kid to look after! What the hell do you want a baby for?"

Velda stared at the floor, scratching a hopper bite on her arm. When she looked up her face was set.

"I want to go back to Earth," she said.

Ethel's chin dropped and he gulped for air a couple of times. "What?" he managed weakly.

Velda smiled, a thin unhappy smile. "I know I can't, not really. But the baby can. I have a grandmother on Earth. I'm going to send the baby to her."

Ethel groped after his scattered thoughts. "You can't afford that! You couldn't afford it for years!" he exclaimed.

"I'm going to send it now, before it's born," Velda said flatly. "It's a lot cheaper than passenger fare."

Ethel could only stare. "How?" he asked.

"The doctor told me about it. You know the hospital ship that comes through once a year? It's due in a week. It'll be landing over at the city port. I can take a supply sled over. They'll operate, and take the baby—the embryo—back to Earth, frozen. In stasis, I think he said. They do it all the time for research and that sort of thing. I'd be back at work the next day."

Ethel could think of nothing to say for a moment. "But that means you won't—" The pain in Velda's eyes stopped him. "Why Earth?" he finished.

Velda looked through the window, picking at the dust under one fingernail. "It's cool there, and green, most of it. I remember it, a little. It'd be nice for a baby. Nicer than here." She thought for a moment, and smiled. "Maybe I could go back too, some day."

Ethel looked into the young woman's face. He found it hard to lie to himself as he had lied so glibly to his workers so often. There would be no passage to Earth for Velda. He saw the softness of that face stretching tauter over the bones through the years. He saw the lines developing, the skin hardening...

"All right," he said. "Go ahead."

"There's just one thing," Velda said quickly. "I... I haven't got much saved, and there'll be the costs of growing... developing... the baby on Earth. Could I owe you for a couple of years, work it off?"

His voice slipped automatically into its customary resentful tone. "Couple of years! What do you think this business is—a charity?" He stopped, strangely embarrassed.

"Oh, all right," he said, turning to go. "See me in the office later."

Velda lay in the ebbing heat of twilight on the pallet, tears running slowly from the corners of her eyes into her hair. Ethel had given her an extra night off. She felt all right, but the crying wouldn't stop.

"Velda?" Robbie's voice came from outside her door. "Come in," she answered, sitting up and wiping her eyes.

Robbie and Conrad entered, Robbie carrying a large black pot in both hands. They stood awkwardly, trying not to notice the smudged tears.

"We've just come to see if you're O.K.," Robbie said finally. "Oh, I'm fine," said Velda. "Sit down."

They squatted on the floor beside her.

Robbie began, "We thought you might be feeling a bit miserable now that the... it's..." She fumbled for words.

"Shut up, Robbie," Conrad cut in. "We brought you a present, Velda."

Robbie held out the pot. "It's only one of Conrad's rocks, really. It's a crystal of some kind, but it grows. One of the miners gave it to him. See, it's tiny now, but if you keep it in this kind of sand, it gets bigger, and opens into a big glass flower that lasts forever. I forget what he called it, but you don't have to water it or anything."

Velda looked from one to the other of her co-workers, then reached out to touch the small crystal bud with her finger. The faceted edges gleamed in the dim light. Reflection followed tiny reflection into its unseen heart. She imagined the final perfect bloom.

"Do you like it?" Robbie asked anxiously.

"Yes," Velda smiled. "Yes, I like it very much."

—G—



# TOO CLOSE TO HOME

John Alfred Taylor

**G**EORGE HAD RENTED maneuvering units and taken Marina Praz out sightseeing. More than ten kilometers behind them, the L-5 complex seemed tiny, its beacons brighter than the stars but no larger.

There was the usual illusion of hanging motionless in emptiness. But George was changeling, the beat frequency between his built-in absolute timing circuit and the two L-5 nav pulses shifting subliminally every second.

Still he was suspended; as a body in space he knew where he was and how fast he was moving, but as a person he was confused. He liked Marina a great deal; they'd been to bed twice, and more important, could talk to each other, really talk, even if he was just a spaceman and she was a shrink with an MD and Ph.D. She understood things right away that Leah never caught on to the whole year they were married.

He'd fallen for Marina hard. Right from the moment he saw her after her arrival at L-5, her hair and face still smeared with the oil of the acceleration tank, her eyes ringed with fatigue from boosting all the way from Earth at 4-G. Not very glamorous, but there was a woman with guts and brains.

Of course at the moment he hadn't exactly been in an objective state of mind. He'd been under Nechayevist guns, having volunteered to be one of the additional hostages they'd demanded, and she'd looked like an angel of deliverance.

Maybe the whole thing was just the natural foolishness of a man recently divorced, the rebound. Besides, he didn't know whether marriage was worth the trouble and trauma any more, especially since she was a groundie like Leah.

More than once he'd almost told Marina how he'd felt, but caught himself in time. And once or twice he'd thought she might say more than she had, but maybe that was all imagination.

At least Marina treated him like an ordinary human being. Not like Leah, for Leah he had always been an exotic, a fascinating monster, which might have been the trouble with their marriage.

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Fred Knecht

TOO CLOSE TO HOME



Still it might just be propinquity. He and Marina had spent the last four days waiting to be called as witnesses in the trial of the Nechayevists, and though talking to each other kept boredom away, she chafed at not being able to observe the trial. (The Council was doing what it could to mitigate her professional frustration; extra cameras had been brought in to supplement the regular record of the trial, eventually she would see it all. As she admitted, even if it went against her training as a participant observer, it could be better in the long run—she'd be more objective, might see more than if she'd actually been present, especially with replay.)

But it was good to be out.

"There's one more thing I want you to see," said George. "Let's link up." Approaching each other, they snapped the maneuvering units together side by side to make one rigid unit, and George worked them around with his pitch and yaw controls.

"How very beautiful," she said. "What is it?"

"The Anti-Proton Facility. Those turning red and blue flashers are on the ends of its solar power vanes, those other warning flashers are station-keeping drones around the works itself."

"But why does the central body shine so—like an opal?"

"That's the magnetohydrodynamic shielding—keeps away micrometeorites—just one break in one magnetic pinch bottle—"

"And no antimatter boost for the interstellar ram. And I suppose no L-5, either."

"Right. Only forty kilometers separation."

"Marina was aghast. "But why?"

"Cost-benefit analysis."

"All the cost-benefit analysis from here to the Moon wouldn't convince me if somebody was making anti-matter in my front yard."

"Oh, it's safe. Lots of redundancies and back-up systems."

"Hmph. You said micrometeorites—What about a really big one?"

"Wouldn't get here. Nothing moves within thousands of kilometers without showing up on multiple radar coverage. Take a look," and he reached up and pulled the telescope on her maneuvering unit around until it locked in front of her. She pushed her faceplate up against the cone on the eyepiece, adjusted the focus. Silence. Then "Just how big is the Anti-Proton Facility?"

"Almost five kilometers long. And the solar power wheel on the end's more than a kilometer across. Hey!"

"What, George?"

"Something passed us—without running lights." He tried to find it again, whatever it was lost among the stars. "Keep watching the Anti-Proton Facility, especially the docking module in the solar-wheel hub."

"Is something wrong?" she said.

"Don't know. Maybe he just forgot his lights. But I'm going to find out." The antenna of the maneuvering unit was slaved to L-5 Traffic Control, so he raised them in a few seconds.

"George Grieve, about ten kilometers out between you and the APF. We've just been passed by a work bull or shuttle without running lights."

"Going which direction?"

"Toward the APF, far as I could tell."

"We'll query its transponder. Stay on this channel."

"I didn't see anything," said Marina.

"You were looking in the telescope," George said. "Besides, the optics of my lenses give me wider peripheral vision. Keep watching the wheelhub."

"L-5 Traffic. We've got you located, Grieve. But nothing else out there."

"I saw it," Grieve said.

"We're running a census query of every vehicle in the area." George whistled tunelessly into his breather mike while he waited. "L-5 Traffic. We have one vehicle neither docked

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nor answering. Work Bull Z05Z."

"I can believe a man forgetting to turn on his running lights," George said, "I can believe in transponder failure, but I can't believe in both."

"We're inclined to agree," said L-5 Traffic. "One moment—please stand by—"

"Grieve," said a familiar voice, "this is Chou." If Station Security was involved, it had to be serious. "We've picked up a workbull on radar—it is heading for the APF."

"Dr. Praz is with me, and keeping the APF docking hub under telegraphic observation."

"George," and Chou's voice was tight and thin, "I think we know who the Nechayevists' onboard accomplice was. Because Able Spaceman Harry Johnson was doing a maintenance check on the Z05Z an hour ago. And because he fits the profile—Johnson had access to mining limpets, and he just came back from a week's leave on the Moon."

"Interesting. But Johnson can't get in."

"He can," Chou said, "the Z05Z was scheduled for the regular support flight, and its docking transponder is already loaded with the day's entry code."

"Well call 'em and tell 'em not to let him in."

"We can't George." All of Chou's suppressed rage came over the channel. "For security our only link with the APF is a special scrambler circuit, and it's been sabotaged!"

"Jesus K. Christ! If he gets inside—"

"He can hold all L-5 hostage unless we release the Nechayevists and grant their original demands. You're the nearest person there is, George. Go after him. We're launching a shuttle in a few minutes, but—"

"OK. I copy. Grieve out."

"Able Spaceman Johnson?" said Marina.

"That's what he said. It puzzles me, too. From what you've told me I think I can understand how a groundie could become a terrorist, but somebody with a real job?"

"Somebody lacking the requisite anomie," she agreed.

He raised Chou again. "Find out more about this Harry Johnson if you can. It might help if we knew what made him tick."

"Possibly. We'll run a full data query, and interview everybody on L-5 who ever saw him sneeze. Anything else?"

"All for now." He turned toward Marina, reached over to open the linkage holding the two maneuvering units together.

"They'll pick you up soon."

"No they won't," she said. "I came up at 4-G from Earth when it was a question of eleven lives. You think you can stop me now that it's all L-5, including me? Besides, I've hardly had a chance to use my training as a participant observer. Which includes a black belt in aikido."

"How about free fall fighting?"

"Adequate."

"OK. Keep your scope on the docking hub if you can." He called up the most efficient acceleration-deceleration vectors and began his burn.

**E**VEN MORE THAN USUAL, there was the illusion of hanging motionless in space, but gradually the flower-shape of the solar power wheel grew larger, though more slowly as they decelerated.

"I see it," Marina said. "Crossing in front of one of the solar power arrays."

"How close?"

"I can tell. Close, close—I can see it and its shadow on the lifeworld."

"Hell." He called Chou. "He'll be in any minute. Where are you?"

"On our way."

"Find out anything about him?"

"Born on Earth, one of eight siblings. Assigned to the Brazilian Reforestation Project for his Youth Service. And he re-enlisted."

TOO CLOSE TO HOME



"Possibly significant," Marina said. "Follow that up if you can."

"Is that you, Dr. Praz?"

"I'm going in with George."

By the time George could see the ZOSZ it had nosed into the docking module. They fell for endless minutes toward the blind wheel.

"One of eight children?"

"Even now there are sects that consider birth control sinful," Marina explained. "The Sons of Los, for instance."

"But the birth tax on the non-quota children—"

"Would make sure he grew up poor."

"Is that what you meant by 'possibly significant'?"

"Yes, with his having re-enlisted in the Brazilian Reforestation Project. Remember the Nechayevist thesis that Earth's population should be cut. He could have been ripe for the message."

"Maybe so."

"Just a guess," she said.

George brought them up by the base of the docking module, grabbed a handhold beside the auxiliary lock, snapped their suit lines to it. Around them the great vanes turned deliberately.

They anchored the maneuvering units and unstrapped themselves. As the lock cycled George looked at Marina; he could hardly see her face through the tinted visor. "Sure you want to do this?"

"Neither of us has any choice," Marina said. "We're here."

"Just so he's not right there," George said and gestured at the open lock. They pulled themselves in, held themselves steady while the lock filled. When there was pressure his earflaps and nostril plugs opened automatically. George opened the inner door, stuck his head around the edge. "All clear. Let's suck our life support packs." Marina unlatched her helmet.

The bell-shaped base of the docking module spread above them, and George pulled himself up one of the ratlines and very slowly put his head through the portal, to find himself facing a dead man lodged against a ventilator intake. "He's been here."

Marina came through the portal behind him, looked at the unlovely sight. "And he's got a flechette gun. Where do you think he is?"

"Probably close, in the lifewheel looking for the others. Always three men on duty."

"Just three for the whole thing?"

"It's all automated. This way." They pulled themselves along the cage of the zero-G conveyor till they reached the roundabout to the lifewheel. "Wish you could have kept your helmet on and breathed—might've protected your face." At least she still had her suit on.

The roundabout matched spin and locked to the door of the lifewheel elevator. "Here we go." They gained weight as they sank to the lifewheel rim.

When the door opened Johnson was waiting for them. George jumped at him, throwing up his hands to shield his face. The sound was deafening, and for a moment it seemed almost as if that was what had knocked him over, until he saw the flechette through his hand and felt the others in his side and legs. Johnson jumped across him, and George turned on the deck to see why. Marina had reacted instantly; the door slid closed and the elevator began to rise.

"Damn bitch!" Johnson's words spilled out in a furious whine. "Bitch like my damn sisters. Billions of bitches. Get rid of 'em all." Sounded like Marina had guessed right.

George lay there, staring up, knowing his photochromic lenses hid his eyes, keeping his chest still. Johnson looked down at him.

He kicked George in the head, but with the antenna crest protecting his skull, George was able to remain convincingly limp. George hoped he broke a toe.

John Alfred Taylor

Johnson opened his flechette gun and reloaded, began to climb the emergency ladder after Marina.

Johnson had to wait at the top of the ladder till Marina was off the roundabout and it matched with the lifewheel again. Once he looked down and George played very dead.

When he was gone George dragged himself across the floor toward the main control console. On the way he found the other two members of the crew; Johnson had gotten them with one burst.

It was hard levering himself up into the seat. The pain was enduring, and his exoskin kept him from bleeding, but he nearly fainted before he triggered a dose of hexamine into his bloodstream. George looked at the board; it would be nice to have somebody telling him what was what, but he was on his own.

Within a minute he had the animated map showing him the positions of the internal security cameras, within another he was calling them up on the monitor screens, shot after shot of empty corridors, working in from the docking module.

The central spine was a cylinder inside a cylinder, with double stiffening bulkheads every 150 meters containing access locks to the particle accelerator rings and magnetic bottle arrays. In every fourth set of bulkheads there was an automatic airtight door; he could close them to isolate Johnson. But he had to close the right two to keep one between Johnson and Marina.

Though Marina wasn't Johnson's real target: George didn't know where Marina was, but he knew where Johnson was heading: the fusion power plant, only 900 meters in from the docking module.

He jumped ahead to the cameras in the fusion control room. Nobody there yet. He could shut the last door now and keep Johnson out. But until he knew where Marina was—

No. What would Marina want him to do? Fusion plants were almost fail-safe, but the almost fizzle reaction would be enough to disrupt some of the magnetic bottles, and once a few went, all would go—vaporizing the Anti-Proton Facility and L-5 in a vast soundless flash.

Sickly, George pushed the button, realizing just how much Marina had come to mean to him in the last two weeks.

He looked up at the monitors again, deciding to work out the axis from the fusion plant as well as in from the docking module; that way the search would keep narrowing.

There was Marina, far down from the fisheye lens of the camera, pulling herself along on the netting. And there was Johnson on the other screen. If he could separate them—

Then he saw the blue location points on the animated map. Johnson was only a bulkhead behind Marina, a bulkhead without an automatic door, and ahead of her there was another bulkhead without an automatic door, and another. He wondered if Johnson knew how close he was.

He keyed in the speaker as she came nearer to the camera. "This is George, Marina. Johnson's only about eighty meters back, and I can't stop him!"

She looked straight into the camera, eyes serious but unafraid. She said something, but there was no audio pickup and George had never learned to read lips. She pushed off and floated toward the access lock door in the bulkhead, opened it, and oozed in as Johnson appeared in the distance.

The lock door closed, too late. Johnson had seen. He pulled himself on in long, easy lunges, the flechette gun bouncing against his chest on its elastic strap. His wolfish face was intent.

Sick with rage and helplessness, George watched as he came up to the handhold beside the access lock, pushed the trigger place. But it wouldn't open. Marina was opening the lock to vacuum! And she'd left her helmet back by the docking module.

Johnson waited till the lock recycled, opened it, looked inside, closed it, and went on through the bulkhead. George sat there numbly, staring at the empty corridor. He felt hollow,

[Continued on page 61]





Joan D. Vinge

# FOOL'S GOLD

Joan D. Vinge

**E**XCUSE ME... PARDON ME—"Wait your turn, pal. We got plenty of work for everybody."

The clerk snatched permission forms out of the air as the draft from the stranger's approach pulled them loose from gravity's feeble hand. He stuffed them into a mesh container on the cluttered tabletop. His expression ate holes in the amorphous mass of faces drifting on line before him; he fixed a steel-hard stare on the man who had upset their equilibrium.

"My name is Wadie Abdhiamal, I'm a government negotiator."

"No wonder you're in a hurry. But you got to wait your turn like everybody—"

"I'm here officially," Abdhiamal raised his voice without seeming to. "I'm looking for a man named Dartagnan."

"Take your pick." The clerk frowned at Abdhiamal's elegantly embroidered jacket-front, away from the bare civility of his face.

"I was told he'd be here, but he's not. Where would he go next?" Abdhiamal's impatience seized the clerk by his own unbuttoned jacket-front.

"To suit up. That way—" The clerk waved left-handed, brushing him off.

Abdhiamal pushed off from the table, scattering the drift of derelict humanity as his arrival had scattered paper. His trajectory angled him toward the corridor entrance the clerk had indicated. He caught at a hand-hold and readjusted his course, pushed off again with undecorous force.

The tunnel let him out into another room as devoid of personality as the waiting room, and as crowded with bodies. Abdhiamal pulled himself up short, searched the shifting mass for a glimpse of remembered red hair, the brown face of Chaim Dartagnan. He saw a dozen strangers already in suits, helmets in hand, lining up before the small hatch in a ponderous steel wall—which he recognized suddenly as a much greater

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entrance on the unknown. All were strangers to him. One was a woman, and the thought of what she waited to do made his stomach turn over... what they all waited to do to themselves.

He looked on around the room, away from the hatch, into the mass of half-suited workers awaiting the next shift. A man he recognized instinctively as an authority figure—a man who belonged here, one who would never pass through that lock—was peering back at him across the broken line of sight. And half-standing, half-drifting at his side—

"Dartagnan!" Abdhimal raised a hand, his voice echoing; signalling the distant lifted face, the suddenly motionless body, toward him.

Dartagnan came across the vast room, trailing an insulated pressure suit, clouded with uncertainty. "Abdhimal?" He caught a wall brace as he reached Abdhimal's side, staring at him. He laughed once, rubbing his head. "What the hell? Working for the government finally drive you to this?"

Abdhimal studied his face unobtrusively. Dartagnan looked thinner than he remembered; tighter, harder... older. It had been barely six megaseconds since he first laid eyes on Chaim Dartagnan; when he had watched him give up his chance for a decent future—watched him lose everything, under the pitiless gaze of the Demarchy's media cameras—because he had put honesty and justice above his own self-interest. But justice was blind, and the only reward society had given him was the back of its hand. Abdhimal shook his head. "Even my job is better than this. I came for you, in an official capacity—about the Siamang affair."

Dartagnan's face aged further. "Why?" He glanced away at the waiting wall of steel, and back. "The trial, the judgement: I thought all that was over. Did she decide to press charges—Mythili, I mean?" His hands pressed his stomach; the suit drifted down out of his grasp.

"No. She didn't change her mind. That part is over."

"Over." Dartagnan's mouth pulled. "Then what?"

"What the hell are you doing here?" Abdhimal said suddenly, unable to keep it in. "For God's sake, man—"

Dartagnan shrugged, looking away again. "It's a year's pay for an hour's work."

"And a lifetime dose of radiation!" Abdhimal's disgust broke through. "You know why they pay you so well." He pointed toward the steel wall/door.

"Sure I know." Dartagnan leaned over, his feet lifting in equilibrium as he picked up the suit. "They gave us the whole hype: Their waldos broke down, and without this plant there's only one factory left to make nuclear batteries for the whole of the Demarchy. They're trying to get them functional again, but in the meantime there's a lot of work only a human can handle. It's all very patriotic." His eyes were as bleak as death. "And somebody has to do it."

Abdhimal shifted uncomfortably. "You don't. This is for losers, not an able-bodied, healthy man."

Dartagnan laughed again; his laughter was like tar. Abdhimal failed to see the joke. "I've had this conversation before. What else can I do? I haven't got a chance in hell of getting a media position with another corporation after I sold out Siamang and Sons—"

"After you brought Sabu Siamang—a murderer—to justice," Abdhimal cut him off.

Dartagnan smirked. "It all depends on your point of view. But I'll never make it as a medianian. If I learned anything I learned that, the hard way, these past megasecs. And I'm no damn good at anything else; at anything that takes any brains or guts or talent..." The suit twisted in his hands, the reflected image of his face tearing apart.

Abdhimal thumped the slick wall/surface beside them with a hand. "If you need to suffer that much, Dartagnan, why don't you knock your head against a wall? It makes as much sense."

Dartagnan looked up, expressionless. "It doesn't pay as well."

"At least when you've stopped punishing yourself, your

body won't go on paying for the rest of your life."

"It's too late for that." His hands were on his stomach again. He watched the suited cluster of workers across the echoing room fasten helmets; watched the air lock hatch unseal, open, release a cloud of spent strangers, and swallow up a new sacrifice. Another line began to form; his line. Beyond the meters-thick seal of metal the actual manufacturing area lay in the open vacuum of Calcutta planetoid's dead and deadly surface. Ever since the Civil War had decimated Heaven system, the factory's production capacity had steadily deteriorated and the amount of radiation it spewed into space had climbed correspondingly. The war had destroyed the critical symbiosis of technologies that produced sophisticated microprocessor replacement parts for plants like this one; the resulting jury-rigged repairs had eaten away at its efficiency.

"What do you want from me, Abdhimal?" Dartagnan began to pull open the seal on the radiation suit, impatiently, nervously. "Or did you just come here to kick me when I'm—"

Abdhimal reached out, stopped him from pulling the suit on. "I came to make you a better offer. I've been in contact with Kwaine Sekka-Olefin's relatives about the settling of his estate."

Dartagnan's arm stopped resisting his grip. Blinking too much, he said, "And—"

"And they feel you deserve some consideration for bringing his murderer to justice. Since I knew you were interested in prospecting—"

"The Mother? They're going to give me his ship?" Dartagnan's intensity jerked them off-balance.

Abdhimal clutched at the wall-brace. "No," gently. He let Dartagnan go. "Not exactly. They're offering you first chance to buy it."

"Buy it?" Dartagnan's free-drifting hand became a fist, and Abdhimal thought for a split second that it would hit him in the face. But something in his expression stopped it; Dartagnan's body sagged. "Thanks for letting me know."

"They know you don't have the money, Dartagnan. That's why they're not asking for payment up front." Dartagnan's head rose slowly. "They're only asking half what the ship's really worth. And they'll give you a certain amount of time before you have to pay them anything. You can use the ship to hunt salvage in the meantime. If you're any good as a prospector, you'll be able to pay it off." He made it sound as fair and reasonable as he could, drawing on his years of experience as a negotiator. He didn't say how hard he had had to pressure Sekka-Olefin's relatives to wring even that concession from them.

Dartagnan let the radiation suit slip from his hand again. He looked away, aware once more of the space beyond their own small cone of contact, the heavy, murmuring despair that filled the room. He studied the new line forming for work. And then he kicked the suit aside. "Let's get out of here."

**M**YTHILI FUKINUKI STOOD before the instrument panel on board the *Mother*, her feet barely resting on the floor in Mecca planetoid's slight gravity. She held her concentration on inventorying the ship's functions; trying to hold back the memories that the sight of the control room roused in her. This was not the first time she had worked at this panel; not the first time she had moved silently and alone through the levels of this immense spider-legged ship's belly. But not entirely alone, the last time...

She blinked her eyes furiously, dissipating the glistening film of double-vision; the golden skin over her knuckles whitened. She would never forget that she had shared this ship with the corpse of its owner, the prospector Kwaine Sekka-Olefin, on her journey back to the Demarchy from Planet Two. She could not stop reliving the nightmare that had preceded the journey when she had piloted the ship sent by the Siamang distillery to rescue him from the uninhabited world—and had almost died there, as he had died there, murdered for his

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wealth of artifact software. The murderer had been his "rescuer," Sabu Siamang, who had left her for dead along with him.

But she had survived, had repaired the prospector's crippled ship, and brought his body back. And she had survived the grueling sideshow of a trial that had followed, to see Sabu Siamang found guilty and sent into exile on an uninhabited rock. But he had still managed to ruin her career and contaminate her entire life with his pathological hatred, and no punishment would ever be enough to repay that wrong.

Or to repay her for the way he had destroyed the fragile net of trust and—and—(her mind would not shape the word)—*feeling* (inadequately), that had formed between herself and Chaim Dartagnan: Chaim Dartagnan, the corporate mediaman—the professional sycophant, the pen-for-hire—that Siamang and Sons had sent along to record the rescue. She saw Dartagnan suddenly in her mind's eye, his hands upraised in habitual apology, begging the forgiveness that she could never grant him. She had shared the journey to Planet Two with him, shared the casual cruelty Sabu Siamang had inflicted on them both. And she had begun to share something deeper; a trust, almost a—

She shut her eyes tightly, setting his image on fire, burning it away. She had thought that he was different; someone who saw through the hypocrisy of Demarch custom, who saw her as a human being instead of a female pilot, a woman in a man's world, an intruder. And she'd believed she had seen through the lie that he lived to find the real man beneath it: a sensitive, honest man trapped in a job he despised, dreaming hopeless dreams.

But Siamang's reign of terror had stripped away her illusions of truth; made Dartagnan prove that at his core he was only a self-serving coward after all, willing to betray her to save his own life. And although in the end he had done all he could to help bring Siamang to justice, still she could never forget.

She looked up sharply from the panel's glowing readout at the sound of someone entering the ship down below. She pulled her face back into an acceptable cypher, smoothed her hands along the cloth of her utilitarian flight suit. This must be Wadie Abdhiamal's arrival. She had agreed to meet him here, to discuss the specific terms under which she could make this ship her own. *Could they spare it?* Resentment made her face twitch. She had lost her job as a Siamang company pilot because she had testified against Sabu; and all Sekka-Olefin's relatives were offering her in return was an impossible dream. She was no prospector—and yet she would have to somehow, miraculously, shape-change into one if she was going to meet the price they were asking for this ship. And this ship was her only chance at a life with any dignity or freedom, now that her job as a pilot was gone forever. No one else in this damned, twisted society would let her do the job she was trained for, and because she was unmarried and sterile, the only alternatives were dead or degrading. She had to succeed; she *had* to—her hands knotted.

"Demarch Fukinuki." Wadie Abdhiamal appeared abruptly, rising up through the concentric railings of the drift-well at the control room's center. He had left his pressure suit down below; he was faultlessly dressed, as always. "I'm glad you're punctual."

Mythili nodded, managing a strained smile of welcome. "Demarch Abdhiamal. You're late." Her smile broadened barely, fell away again all at once as she saw that he was not alone.

Abdhiamal pushed off from the railing, drifted to one side of the well and settled, leaving the opening clear. She watched another head materialize in his place, shoulders, arms, body... *Dartagnan. Dartagnan.* The word repeated over and over in her mind as she tried to believe what her eyes showed her. "Dartagnan!" Surprise shouted it, and anger, and betrayal as she realized what his presence here must mean. "What's he doing here?" She turned toward Abdhiamal

furiously; knowing the answer, making the question an accusation.

"Mythili?" Chaim caught himself on the well-railing, jerked his rising body to a halt.

She glanced at him; a split-second of the incredulous look on his face told her that he was no more a party to this than she was. She looked back at Abdhiamal before Chaim's eyes could catch and hold her own. "You had no right to do this to... to us! I won't work with him—" Her hand shot out.

"I'm afraid you'll have to, if you want this ship." She heard the vaguely condescending tone that he could never quite keep out of his voice when he spoke to her. "Sekka-Olefin's relatives agreed that the ship should go to both of you, since you had an equal share in bringing his murderer to justice."

"Equal—?" She choked back the rest, looking from face to face again, feeling a cage close her in. "Whose idea was that? I suppose you think this is all terribly clever, Abdhiamal, setting me up like this—"

"Wait, wait," Chaim put his hands up, palm-out, in the placating gesture that set her memory on edge. He finished his ascent into the room, dressed in a drab gray-white jumpsuit like her own, no mediaman's camera slung at his shoulder. "Abdhiamal, what is this? You mean we share in this—?" His hands spread, taking in the ship around them, but his eyes stopped at her face. "Why the hell didn't you say something?"

Abdhiamal smiled, smugly omniscient. "If I had, would you both be here now?"

"Yes."

"No." Her refusal went directly to Dartagnan.

"That's why I didn't tell you." Abdhiamal shrugged slightly, tugged the hem of his loose jacket back under his belt. "Listen—the two of you tried to do something worthwhile, the right thing. And you weren't rewarded for it, you were punished. I'm only trying to do my job, which is to see that things are settled fairly. This is the best I could do. It's up to you from here on."

"Thanks, Abdhiamal," Chaim said, as though he meant it. "Even if we can't keep the ship, I'll always appreciate this," looking back at her again.

Abdhiamal nodded. "I appreciate the appreciation."

"I hope you'll do us one more favor, then, Abdhiamal," Mythili pressed her hands together fitfully, avoiding both their gazes. "Get out of here, and leave us alone."

Abdhiamal bowed his acquiescence, and glancing up she couldn't detect any change in his expression. He moved toward the exit well easily; Chaim threw an apologetic glance after him. "Thanks again, Abdhiamal."

"Let me know what you decide," Abdhiamal disappeared into the well.

Mythili turned back to the control panel, listening to his echoes recede through the ship, filled with sudden claustrophobia. To be alone in this place with one man—this one man—was to feel the hull close around her in a way that it had not when she shared it with the two of them. She punched in a sequence on the panel, clumsily with haste, opening the segment of wall that became a port above the viewscreen.

She looked out on the docking field abruptly; on the ungainly insectoid forms of the volatile tankers, clutching the flaccid sacs in which they transported unrefined and semi-refined gases to the Demarchy's distilleries. Immense ballooning storage tanks ringed the eternally eclipsed field, obscuring the light-hazed horizons of Mecca planetoid. Beyond the field's fog of artificial light she knew that a starry black infinity of space lay on all sides, and that she was not a prisoner.

Dartagnan came toward her from the hub of the cabin; she sensed his movement more than heard it, and turned to meet him. "Don't come any closer. Please." She brushed her short, night-black hair back from her face irritably. He stopped himself, wavering as he regained his balance; his open disappointment reached across the space between them.

"Mythili, I didn't know about this—"

"I know you didn't." She cut him off. In his eyes lost images were rising; something between disgust and terror would not let her see them. "You don't need to fawn on me, Chaim. I'm not working for a corporation any more. And neither are you, from the looks of it."

"No." His head stayed down; he stared at his own long-fingered brown hand clenching over a seat-back before the panel. "Sorry," still apologizing, compulsively, for something beyond words. "But maybe we've bottomed out, Mythili. Maybe we've changed our luck." He lifted his head slowly. "This ship—look at it! It's all ours; it's giving us a chance to start over again, and prove we've got the guts to live by our own rules, this time. This is a dream come true—" His wide mouth stretched wider in a hopeful smile.

"Your dream, not mine!" She rebelled against the part of him that had included her in it without asking; against the part of herself that might have been glad. "I never wanted to be a prospector, I don't know a damn thing about it. I don't want to spend the rest of my life as a junker, living on the edge of starvation. And I don't want to spend it sharing this ship with you, Dartagnan!"

His whole body tautened visibly. "I see." He sagged, as though the unseen tensions that pulled him taut had let him go again abruptly, leaving him more formless than before. But the yielding softness had gone out of his brown eyes, and he looked at her without hope, or apology. "So it's not your dream. Have you got anything to put in its place? No—or you wouldn't be here. You don't know a damn thing about prospecting; but I do. Only I can't pilot a ship this size well enough to get it into the places a prospector has to go. You can. Let's face it, maybe we don't want each other," with almost spiteful satisfaction, "but we sure as hell need each other. I want this ship; I want this chance at a real life. And even if you don't want it, you want a chance at some kind of life, and this's your last one. I can stand it if you can." His free hand clutched the arm that anchored him to the chair.

Mythili bit the inside of her mouth until she felt sharp pain, until the first response died in her throat. "All right. I agree with everything you say. I'll work with you, because I have to. We'll share whatever we find fifty-fifty. But that's all—" words escaping again in spite of her.

"That's all I expected." Chaim moved his mouth, imitating a smile sourly. "And I think there's one more thing we can agree on—Abdhiamal really screwed us both."

**I**N THE ARTIFICIAL BRIGHTENING of a new day, Mythili left her tiny rented room and took an air taxi out across the echoing, kilometer-wide vacuole that held Mecca city. The towers of the city clustered on every side, their many-colored surfaces shimmering with faint movement—thin skins of plastic stretched over aluminum bones. They filled this artificial cavity in the rock like crystal growth within a geode, heavier along the axis of gravity's feeble drag. The sight did not touch her with wonder as it once had; today she scarcely saw them at all.

She had agreed to share a ship and a gamble with Chaim Dartagnan, and now she was about to back it up, taking all that was left of her life's savings to buy the equipment and supplies they needed to make their trip. It was insane... but what else was there? She felt the tension that had shocked her awake after a night of depression-drugged sleep winding still tighter at the center of her chest. She swallowed and sighed, breathing in the spice-scented air; but the tightness came back, and the taxi closed inexorably with her destination.

She made her way down the central core of the Abraxis commercial building, settling like a feather into gravity's soft well of suction. The skin of the building walls was golden, and she felt herself suffocating, sinking through honey. Workers and customers moved past her, propelling themselves like swimmers from the corridor's wall. She let them pass her, letting her own slow sink-rate remain undisturbed.

The ship-outfitter's business, with its massive displays, occupied the two bottom-most levels of the building. Grimly she pushed aside the flaps of the upper-level entrance, found herself in a catacomb of stabilized boxes and closed mesh containers. She moved cautiously through the narrow aisles, where a handful of desultory strangers inspected navigation equipment she identified at a glance and prospector's gear she could not recognize at all. They stared as she passed, herself an unclassifiable oddity in this male domain.

She emerged finally into a large, less cluttered area; saw Chaim at last, gesturing over and around an equipment list, a



pile of purchases growing tentatively at his feet. He glanced up, as though her tension radiated like cold, and broke off his conversation with the shopman. But his face stayed flatly expressionless, unlike her own; the gift of his career as a professional liar. "This is my partner. She'll fill you in on anything else we need."

She moved across the open space, joined the two men beside the counter where a small screen recorded the growing cost of their journey. The shopman regarded her with mixed emotions; she ignored him for the pile of supplies. She stared at the screen again, tallying the list in her mind, feeling a resentment rooted in something deeper than her ignorance of a prospector's needs: "Do we really need all that, Dartagnan?"

"We need more. But we can't afford it." He glanced uncomfortably at the shopman.

"What about that spectroscope? The ship already has one." She touched the one word on the screen that she really recognized, her fingers rigid.

"Not good enough. Sekka-Olefin already knew what he was looking for, and where to find it. We don't. We need all the help we can get."

She shrugged, her mouth pulling down. "All right."

"What about navigation equipment?"

"I checked the ship's system over again. It's in fine shape. There's nothing we can afford to add to it that would make a real difference."

He looked relieved, the first genuine expression she had seen on his face. "Then I guess we can afford to eat, after all."

"You want me to go ahead and fill the rest of your order, then? The shopman addressed Chaim."

"Yeah," Chaim passed him the list, glancing her way. "Go ahead."

She looked away from him, becoming aware of the man in worn coveralls who waited, listening, at the edge of her sight.



He moved forward at her glance, intruding on their circle of consciousness. Another prospector, she guessed, and not a very successful one; a heavy-set man who looked old, older than he was, because a lifetime spent exposed to shipboard radiation aged the body badly. His dark brown, graying hair was clipped close along the sides of his bald head, and his broad, gnarly face was seamed with lines that could have been good-humored. As if to prove it, he smiled when she looked at him. She did not smile back. Undaunted, he pried open their privacy and included himself in it.

Chaim turned at his approach, ungraceful with surprise.

The prospector squinted. "Aren't you... yeah, you must be! Gamal Dartagnan's kid? I'll be damned! Imagine runnin' into you, after all this time."

Chaim stared, mildly disbelieving. "You knew my old man—uh, my father?" groping for a civil response.

"Yeah, I sure did. We were great friends, him and me. Almost partners."

Mythili felt her face pinch together at the falseness of the tone. Chaim's own face had become a vacant wall again; a defense, against what she wasn't sure. "What's your name?"

"Fitch. He must've mentioned me—"

"No." Chaim's boot nudged the pile of supplies; containers

stirred sluggishly and resettled. "How'd you know me? We didn't look much alike."

Fitch laughed, unaffected by the lack of positive response. "The hair. Anybody'd know that hair. And he talked about you all the time."

Chaim's expression became slightly more expressionless.

"And you're kind of a celebrity, you know—all the media about old Sekka-Olefin's murder, and how you brought the killer in, with the help of the little lady, here."

Mythili considered silently the fact that she stood half a head taller than Fitch, and wondered why she couldn't find the irony even slightly amusing; wondered whether she had lost her sense of humor permanently.

"And now word has it that you've got yourself Sekka-Olefin's ship. Word must be right, or you wouldn't be here outfitting. Following in the old man's footsteps, huh? Got a damn fine ship for it, from what I hear. You know much about prospecting?"

"Only what I learned by doing it, with my old man." A controlled sarcasm oiled the words.

"Oh, yeah?" Fitch laughed again; a trace of self-consciousness weakened it this time. "Well, he was a damn shrewd man. But still, you couldn't have spent much time out there. It takes a lifetime of experience—"

"A lifetime wasn't enough to keep an accident from killing my old man." Chaim's frown broke through. Mythili saw Fitch's face begin to lose hope, struggle to hold onto it. "What do you want, Fitch? You want something?"

"I just wanted to meet Gamal Dartagnan's son. Gamal was a man with a big heart and some big ideas, and I figured you might share them... I wanted to know if maybe you could use some help." He threw the words out with too much energy. "I mean, I've got a ship of my own and all—I've spent my whole life searching salvage. But my ship can't do anything like what that one of yours could; she just doesn't have the reach. Just like your old man—if he'd had a better ship, he could've made a million, I'm sure of it. I've got the experience, I now where to look... I've got a lot to offer a partner." He craned forward.

"He has a partner," Mythili said abruptly. "We can't afford another one."

"She's right. There's already one too many... for better or worse." Chaim grimaced. "The ship belongs to the two of us, Fitch. We'll make it on our own, or not at all. We don't need any more 'help'. We're up to our necks in it." His hand chopped the air like a headsman's blade, cutting off the conversation.

Fitch withdrew, deflated, shriveling. "Well... I'm sorry you feel that way, but I guess I can understand it," thickly. "It's a loner's trade, prospecting. You got to think of yourself first, and make your own chances. But just to show you I understand, I want you to have this signal separator." He held it out, packaged in plastic foam. "It'll stretch the range of your equipment. Maybe it'll bring you luck. I was going to put it in my ship, but there's nothing much it'll change for me. Maybe when I see you again, you'll remember I gave you this, and reconsider taking on a partner."

Mythili opened her mouth to refuse it, hearing the same hollow hypocrisy in his humility that she'd heard in his bluster. But Chaim reached out before she could speak and took the package from Fitch's hands with a small, stomach-tight bow of acknowledgement. "Thanks. We appreciate it." The hostility had disappeared from his eyes, and he actually seemed sincere. Mythili closed her mouth without saying anything, surprised into silence.

"Good luck to you," Fitch bobbed politely in return, disappeared again into the maze of pile supplies as unexpectedly as he had come.

The shopman shook his head, one hand hugging the inventory terminal. "Who can figure junkers? That's the first thing he's paid for up front in half a gigasec—and he gives it away." His drooping black mustache moved as he pushed his

moult out, and he drifted away.

Mythili looked back at Chaim, still holding the separator in his hands. "Why do you want to be bound to that sleazy piece of quartz?" as much curious as disapproving. "He looked like he's never made enough scavenging junk to pay for a cup of water. Why do you let him give you that?" She bent her head at the package.

"Because we can use it. That's Rule One." Chaim looked at her steadily, forcing her to acknowledge him. "And because if we don't get lucky, we'll end up a gigasec from now just as lousy as he is." He let the separator go, watched it drift down and impact dully in the pile of supplies.

"Lifting." Mythili flicked the final switch of the sequence, felt the almost imperceptible shudder of the ship's transformation from stasis to motion. They began to move slowly—like a pageant starting, she thought—outward and away from the docking field. Watching through the unshielded port, she felt the shackles drop from her own existence along with the prison that Mecca had become in these past megaseconds. Elation swelled inside her, unexpectedly, a soft explosion of heart-music spilling into her veins as she looked out on the infinite night, the star, Heaven, rising like a promise of new beginnings past Mecca's shrinking horizon.

She glanced sideways at the small intrusion of someone else's sigh, saw Chaim Dartagnan pressed intently against the panel just beyond reach. Her elation fell inward, became a tight compression aching at her core. Her freedom was illusory, uncertain, as ephemeral as the life of a fly. There was no promise that there would ever be another journey, if this one failed. And whether this journey succeeded or not, she would have to endure his presence; the dark, turbid waters that every glimpse of him eddied in her mind. She felt her mind replay the images of the past on the screen of the present, as it had done over and over on the empty walls of her rented room: the last time she had piloted a ship with Chaim Dartagnan on board; the humiliation, the suffering, the death of Sekka-Olefin—the death that had almost been her own, because of Chaim Dartagnan's weakness.

Chaim looked over at her, away from the widening blackness of the sky, as if the intensity of her stare were something he could hear. He shook his head slightly, almost unconsciously; she didn't know whether he was reorienting his own reality or making a denial.

Mecca had dropped completely from sight below them; the distant diamond-chip sun was centering in the port and on the readout screens. She looked back at the panel without comment. The barely perceptible thrust of the ship's nuclear-electric rockets was slowly but constantly increasing their speed, beginning the long journey in from the Demarchy toward the broad torus of drifting worldlets that was the Main Belt; where before the Civil War the majority of Heaven system's population had lived—where the majority of it had died.

The Civil War had turned the Main Belt into a vast cemetery, its planetoids into gravestones for a hundred million people. The Demarchy, isolated in the fore-Trojans—a cluster of planetoids located in the orbit of the ringed gas giant, Discuss—had emerged virtually unscathed, but virtually alone in their good fortune. Their postwar struggle to survive had already stripped the Main Belt clean of its most obvious technological artifacts; but individual scavengers still picked through the ruins, hoping for some fortunate oversight that would make them rich, or at least let them go on searching.

"What happens when we reach the Belt? Where do we start?" She begrudged having to ask, tried to keep it from showing in her voice.

"We start as soon as we're close enough to the first rock we meet to scan it. My old man never overlooked anything, even if it wasn't on the charts. Every other prospector who's ever been in to the Main Belt has the same set of charts on file that we do,

and they've been picking it over for a couple of our lifetimes." He pressed a sequence of buttons on the panel almost roughly, and a navigation chart flashed onto the middle screen between them. "Of course, it never did him a damn bit of good, in all the time I was with him. He had 'big ideas,' like Fitch said, and nothing else. He was always sure he could've found some battery plant that disappeared during the war, or a lost starship orbiting the sun—or complete happiness in a goddam hydro tank, for all I know—if he just had a better ship, or more supplies, or an even break... They're all alike, the damn fools; looking for fool's gold." He struck another button, and the screen went blank. He sighed, letting go of his anger. "But then... one of his crack-brained ideas finally paid off for him, in the end."

She half-turned in surprise. "It did? Then why aren't you—?"

"—rich?" He laughed the way he had pushed buttons. "Because he had an accident that killed him before he could collect. His luck ran true to the end; all bad. A corporate scout filed on his claim and they got it all."

"What went wrong? What happened to him?" in spite of herself.

"I don't know." Chaim's arms crossed his stomach, his hands pulled restlessly at his coveralls. Mythili felt her own stomach clench and turn, remembering what had happened to Sekka-Olefin. "But it doesn't matter to him any more. And it probably won't matter to anybody before much longer; not even to me." He pushed off from the panel, reached the rim of the well to the lower levels and sank into it.

She felt words rattle against her teeth like pebbles, cold and heavy. But she turned back to the board, watching the chronometer tick off seconds like a census of stars.

**T**HE CENSUS MOUNTED. As seconds piled up into kiloseconds and megaseconds, Mythili wove patterns of behavior that avoided Chaim Dartagnan as completely as possible, keeping her mind as empty of his presence on board as the night they moved through was empty.

Yet even the emptiness turned against her; not bringing her peace of mind, but only leaving room for memories to grow wild, spiny and bitter. She could deny the present or deny the past, but not both together: more and more she could see only the sameness of this voyage to the last one she had made with Dartagnan the mediaman, and Sabu Siamang the killer. There was no solace in silence, no comfort in avoidance, no escaping from the gray limbo of her own mind.

She forced herself to perform the routines of her normal shipboard duties—although until they reached the Main Belt her responsibilities were few and unchallenging. From time to time she was aware of a brief, random fluctuation in the ship's energy levels; but her cursory attempts to trace the source came to nothing, and gradually it drifted out of her thoughts again. She did not bother to mention it in her brief exchanges with Chaim—she spoke with him only when she could not avoid it.

She ate listlessly, alone in her cabin; slept badly, dreaming dreams filled with vivid terror which hung on into her waking. She tried to read the books that lay in her private trunk, that had always been her solace; but even they were corrupted by the knowledge that once Dartagnan's hands had violated them, that his mind had shared the intimacy of their pages and intruded on her own innermost thoughts. She put them away in her trunk again, hating him, hating all men. Hating even her father, who in his own weakness, unable to produce the son he wanted, had given those books to her and encouraged her to act a man's role in a world that would never accept it. And she felt herself sliding farther down the yielding walls into a formless blackness where nothing had meaning; knowing that she needed something, anything, to hold on to, but lacking the strength to reach out and find it.



She gathered enough strength, wearily, to perform the functional act of feeding herself one more time; even though her stomach was a small, hard lump of denial. She slipped out of her cabin, confident that Chaim was not outside his own across the well, and let herself fall downward into the eating area. The *Mother's* living quarters were spacious for two people, having originally carried a crew of eight, and she recoiled from the emptiness of the commons after the womb-small security of her own cabin.

But as her eyes readjusted their scale she realized that she was not alone this time. Chaim balanced lightly on a seat at the near side of the wide, dull-metal table in the room's center. He turned as she entered, his face almost eager. She looked away from it quickly, not quickly enough, as her feet settled with a click onto the mirroring floor.

"Mythili—"

She moved away from him stubbornly, toward the food lockers. She pulled a can out of one and pushed it into the warmer without even looking at the label. "What are you doing here?" resentfully. She had redesigned her days almost unconsciously so that she ate and slept at nonstandard times, the better to avoid even the sight of him.

"Waiting for you."

"Why? Is there some problem with the ship?" She half-turned, glancing back.

"Yes." He straightened, balancing against the table, searching her for a response. "With the crew, damn it!"

"What do you mean?" She turned her face away again from the anger in his voice.

"Who do I mean. I mean you, for God's sake. You see anybody else on this ship?" He gestured, almost losing his balance. "It won't work like this. We can't go on pretending there's no one else on board. I can't anyway. We're partners. Like it or not; and we've got to face it or we won't survive. It won't work like this."

"I know," almost inaudibly. The heated container of food popped out at her and she jerked back.

"Do you want it to fail? Don't you care whether we make it or not?"

"I don't know."

"What?" demanding, not asking.

She bit her suddenly quivering lips, held her face and body rigid against the counter. "Yes, I care." Some part of her shouted silently that it was a lie, *No, God, I don't give a damn; it's all useless*. Her hand gripped the air, reaching out to something nameless.

"Mythili... are you all right?" His anger faded as suddenly as it had come; his voice gentled, his concern reached toward her uncertainly, brushed her straining fingertips like a touch. "Can I help? Let me help, if I can."

She pulled her hand in, pulled her voice and her self together. "I'm fine!" The past and present fused into one inescapable cage of hot steel.

His silence lay as loudly as speech in the space between them. "I'm not fine," he said at last, confessing almost defiantly to the weakness she would not admit. "It's like I've been on this ship all alone!" She didn't understand the peculiar vehemence of the words, didn't try to. "I know you've been avoiding me. But damn it, I haven't given you any reason to, have I?"

"No reason? What reason do I need except the sight of you!" She turned to look at him finally, brushing at her disheveled hair.

"What the—?" What's that supposed to mean, for God's sake?" His face clenched.

"It means that every time I see you I remember what happened on Planet Two," feeling Siamang's rough hands tearing at her clothing; what he had wanted to do and almost had done to her, before they had abandoned her on the lifeless

surface. "That it happened because you wouldn't help me, because you didn't have the guts to stand up to Siamang. You used me as a pawn to save your own life, and every time I see you I remember that!"

"Well, what the hell do you want me to do about it?" He held out his hands, but they were knotted into fists. "Do you want me to mutilate myself, so you don't have to see this?" One hand leaped at his face, as if he really meant to dig his fingers into the flesh. "Do you want a stick to beat me with? Is that what you want from me? God damn it, Mythili, do you think there's anything you could do to me, say to me, think about me that I haven't done myself?" His hands dropped away. "But it doesn't change anything. What happened on Planet Two happened. Yes, I was scared, I didn't want to die. I did the best I could—it wasn't good enough. I'd do anything to make it right; but there's nothing I can do! I wish to God you'd pressed the charges against me, and gotten it over with!"

"I don't know why I didn't!" Her voice broke under the weight of the lie, the knowledge of why she had never pressed charges, and why she could never let it go. "But I didn't. And if I didn't, I... I have to live with the consequences, I suppose. I have to face the fact that we are on this ship—together," lamely. She clasped her hands around the food can like a holy offering refused, a useless prayer for understanding. She moved it stiffly to a magnetized tray and felt it click down on the surface, aching to feel the same stability seize her own life and hold it fast. "What do you want changed, then?"

His mouth worked. "I need to see a human face once in a while—you'll have to do, since it's the only one here besides my own. I'm not asking to share your body, for God's sake"—expecting a protest as her mouth opened—"just to share my meals with you. That's all I want. You don't even have to talk if you don't have anything to say to me."

"All right." She nodded, surprised to feel an immense and inexpressible relief filling her. "I guess that's fair enough," knowing that it was both less and more than that. She carried the food she had heated to the table and settled there with it, not close to him, but not pointedly far away. Peeling back the plastic she discovered a serving of unflavored green beans, and nothing more. She ate them in silence, feeling his eyes track every bite. She took the container to the disposal when she finished, with no appetite left to make her heat up something more. Nodding self-consciously she pushed off, rising up like a bird, seeking freedom in flight.

"See you at dinner."

She saw him at dinner, and three times a day-period from then on; oftener, sometimes, when he joined her in the control room as she fitted their trajectory to the Main Belt's fluid ballet. She brought a book with her to the commons, a shield against contact; although she only stared blindly at the pages while she ate her tasteless, haphazard meals. But somehow she held herself offering the book to him, to avoid his staring curiosity; and then because she had, forced to discuss the implications of the tedious *Old World* essays on ecological adaptation. Although she was never certain whether he had any more real interest in the subject that she did, her appetite gradually returned, along with something like her old ability to speak without effort.

But still she found no enthusiasm anywhere in herself, no more than a weary acceptance of things she could not change. And Dartagnan's appetite dwindled until he seemed to live on soy milk, and she saw him surreptitiously swallowing nameless pills. His face grew hollow, bitter brackets tightened at the corners of his mouth. She wondered whether he was sick, got an irritable denial when she tried to question him about it. She didn't ask again, but nursed a fresh resentment.

**T**HEY REACHED THE PERIMETER of the Main Belt at last, and she altered their course to intersect the orbit of the first planetoid they encountered. But their scans showed them nothing of any value, no sign that a human being had ever even visited this tumbling spark of sun-washed rock. They encountered another, and another, as they pushed deeper into the riverflow of stone, but none of those showed any signs of life or profit. They changed course again, tracking down the first of the planetoids shown on their charts with a name—one that had actually held a population—only to find a blasted clump of rubble screaming with radiation.

They went on from there, moving farther in across the Main Belt's track of desolation, moving farther upstream against its flow, farther and farther from their origin and ultimate destination. They intercepted more worldlets, named and nameless, each encounter becoming a new defeat.

But still they went on searching, letting the ship hope for them as their supplies of food and faith dwindled. Until at last the empty ritual scan for man-made materials performed on one more featureless, nameless piece of rock began to read out in positives. They looked on in silence as the vital signs spilled onto the screen; Mythili felt Chaim catch her own fear of shattering the moment's reality with a word. She moved past him along the panel's grips, still without speaking, and began to set their course to match speed and trajectory with #5359.

The kiloseconds passed, and she brought the *Mother* into position above a silver-lit, artificially-smooth docking surface. She matched the stately rotation of the tiny planetoid's surface, until its pitted anti-silhouette seemed to stand still beneath them while the universe revolved in another plane of existence. And then she set the gentle motion free that closed the final kilometer separating them from their destination. The ship settled toward the stone, touched down with the fragile impact of a dragonfly settling on water.

She felt Chaim smile beside her in unconscious appreciation, felt it color with envy as he watched without sharing in her skill. She had denigrated his attempts to participate in the operation of the ship, undermining his confidence in his ability as a pilot; attempting to keep her own position secure against his claim of prospecting expertise. Although it kept her from sharing his knowledge, still she would not risk the vulnerability that an exchange of powers would open her to. And now she savored the triumph, however momentary, of her own skill over his. Chaim pinned his restless hands under his belt; his eyes were still on her, although she kept her own stubbornly on the viewscreen filled with gravel and stars.

"Good job," he said at last, trying to keep his voice noncommittal. The canvas of his belt twisted.

"A little rough," She lied, knowing that no one could have done it more cleanly, knowing that he would know it, too.

They pulled on their pressure suits in silence. She considered the different qualities of mood that she had come to recognize in the megaseconds of silence between them, and that none of those silences had ever been an easy one, and that this one was coiling ever tighter around the mystery of what lay waiting. She put her helmet on with an abrupt movement, locking it in place almost frantically; straining for the sound of oxygen feeding into her suddenly self-contained universe from the pack on her back. Still she remembered Siamang's hard strength jamming shut the feed-valve that cut off her air, before he had forced her into the lock and out onto Planet Two's blue-dust plain to suffocate and die. Every time she closed herself into her suit again, the memory came crowding in to share it. But air fed smoothly into her suit and cooled her sweating face as she followed Chaim into the airlock. The silence expanded while vacuum formed around them.

They trailed the mooring rope down in a slow arc to the bright gravel, dropping through the pelting drizzle of pebbles still settling out of the hailstorm their landing had dislodged. There was no evidence that she could see of anyone having

been here since the Civil War, over three gigaseconds before. But even if no one had scavenged here since, there was no promise that there would be anything worth their taking, no reason to believe that this would be anything more than another milestone on the road to ultimate failure. Desire and need shouted down the dark voice of reason, shouted to the sun and stars that this time, *this time*...

They found the sealed hatch that gave access to the dwelling-vacuole of this private estate, a miniature of the city planetoids where she had spent all of her life. Chaim pressed the plate that would cycle the lock. There was no response: the



lights set into the door's surface did not even flicker red or green, but stared up at them blindly, dust-filmed, like the eyes of the dead. He grunted, braced his boots against the footholds in the doorframe and leaned over to operate the manual hatch release—the wheel *ohing* like a mouth below blind eyes.

The hatch popped at last, exhaling a final, long-held breath of fossil air. Chaim glanced back at her. She heard his breath heavily in her helmet speakers, but he said nothing as he finished pulling the hatch outward and moved down into the throat of stone beneath it. Mythili looked up and out once more, at the heavens wheeling in slow majesty above them, before she followed him down.

They resealed the hatch laboriously, opened the valve that bled a new mouthful of interior air into the claustrophobic darkness of the dead lockspace. At last, as pressure equalized, they pushed open the inner hatch and entered the tunnel beyond: Entered into utter blackness.

"Shiva—there's no light!" The protest burst out of her before the conscious thought could form or answer itself. She had never been in an unlit vacuole, never thought that without man-made light...

Chaim switched on his belt latern, flooding the long tube with technology's inconstant illumination. "Their atomic

batteries must've died long since. These places are almost all like this, now."

"I never thought... never thought about how it really was," stupidly, still realizing that she had only begun to grasp the enormity, the totality of death and destruction that civil war had brought to the Main Belt.

"How it will be. That's the future you're looking at, not the past. We're the past—we've run out of time."

"What are you talking about?" she snapped, trying to recover her own sense of equilibrium. "This all happened before we were born."



"But it doomed us—all of us. Sekka-Olefin knew, that's why he wanted the money from that software he found on Planet Two so much. He knew we were all dying, because we can't keep our technology going, and we can't survive in space without it. While he was stuck on Two he found out about its atmosphere being breathable, and he wanted to start a media campaign to get people to move there, before it was too late."

"Move there?" Her mind moved back through time and space to the final moment when she had clawed off the suffocating helmet of her suit, on her knees in the blue-gray dust, and sucked in the lungful of impossibly thin, searing cold free air of Planet Two; the breath she had thought would be her last. "He was crazy! And so are you."

Chaim frowned. "Then tell me what we're doing here, picking the bones of the dead. And tell me what the Demarchy's going to do when there's nothing left on them."

She felt the cold grip of his doom-saying press her flesh unexpectedly, threw it off in anger. "You sound like you're afraid of the dark."

"You're damn right I am." But she knew it was not the darkness of this place he was afraid of. He gathered himself and pushed on along the tunnel, his light battering the walls and forcing open the way ahead.

Joan D. Vinge

She followed sullenly, overlapping his light with her own.

"Geez Allah!" His curse rattled inside her helmet as she caught up with him where the tunnel ended. "What the hell is this place?"

Peering past him she saw not an opening-out into a larger room or rooms, but an abrupt barricade of some striated material. The passageway funneled down into a narrow wormhole of access. She reached out past his shoulder, running a glove over the wall of unidentifiable material; feeling its solid mass resist her, yet feeling individual striations give under her pressure. She felt a sudden charge build in her as her brain cross-referenced. "Printouts! It's all printouts—kilos and kilos of them."

"More like tons and tons." Chaim braced his feet and threw his weight against the wall of paper, but there was no give to the greater mass. "All piled up for the recycler that never came back."

"No." She shook her head. He looked at her. "There's way too much here. Even if they saved every news report and corporate hypesheet from the whole of the Main Belt, there must be half a gigasec's worth here. It couldn't be just the post-war breakdown."

"But why? Why would anybody save old hypesheets, when everything was in info storage anyway?"

She shrugged inside her suit. "Maybe it was a hobby. Are we going on through?"

He bent over, throwing light into the paper-walled tunnel. "I don't know. I can't see anything, if it even ends... God, what if the whole damn rock's stuffed full of this, and we get stuck with nowhere to turn around?"

"Somebody lived here. There must be something else in there besides paper," impatiently. "I'll go first, if it bothers you." Coward. She refused to let herself even begin to shape a mental image around his words. She reached up to loosen her helmet. "If we take off our suits we'll have more room to move—"

"Wait." He caught her hand, freezing it in mid-motion. "Leave that on. The purifier's dead. You don't know what these places can smell like. Or look like... I'd better go in first." She saw his face through the dark reflection of her own, helmet to helmet; saw the strain-sharp line of his mouth that bit the words off raw-edged. "Wait here."

Remembering that he did know—and that most of the Main Belt had died of slow starvation or thirst—she dropped her hands and waited. He squirmed like an eel into the depths of the printout mass. The seconds passed, and more seconds; until the darkness lost its form and grew timeless, until she could not keep the images of suffocating gullets choked by warm human flesh out of her mind—

A small grunt of surprise or disgust came out of her suit speakers; Chaim's voice, from somewhere beyond the wall. "Chaim—?" Her own voice startled her more, squeezed with unexpected tension.

"S okay." His reassurance slipped, on uncertain footing. "I'm through. Come ahead, there's a room here. But get ready; there's a couple of bodies, too."

She felt her skin prickle, coldness in the pit of her stomach. But she had spent megaseconds with the frozen corpse of Sekka-Olefin on board his ship, returning to Mecca from Planet Two. She was no stranger to death. She tightened her hands, loosened them again to pull herself into the printout mass. Clawing with her heavy gloves, thrusting and kicking like a swimmer, she worked her way along the uneven intestine, following the beam of her light. At last she saw the beam spread and diffuse, blinked as it was answered by another light beaming ahead. Chaim caught her reaching hands to draw her out of the tunnel; unable to avoid it, she let him pull her through.

"Thanks." She freed herself from his grasp as quickly as she could, looking away from his face. The glancing brightness of her belt lamp showed her a haphazard plastic meshwork criss-

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crossing the inner surface of the piled printouts, to keep them from collapsing in down inevitability toward the iron-rich asteroid's feeble gravitational heart. *This is all of it, then.* But as she kept turning, following the line of the room's inner surface, she saw more piles of printout, and heaps of plastic packing crates broken down, immense bags bulging with unnameable contents, heaps of old clothing or rags.

In the center of this carefully filled space a small living area barely survived: a tiny metal table and chairs disorientingly bolted to the far wall—following gravity's lines as she did not—and a wide mat of foam heaped with more piles of rag. *Bodies.* He had said there were bodies. Her eyes fixed on the shapeless rag-piles with horrible fascination. She drifted out into the open center of the room as her staring and the harsh light of her lamp began to pick out protruding ends of bone, the pitiless white dome of a skull, the glaring black hollows of its sockets.

She twisted suddenly in the air, trying to stop her forward motion with nothing to stabilize her; banged into the metal tabletop with a curse. The echoes of her collision and her shout seeped into the soft detritus along the walls, the room closed its silent disapproval around them again. Chaim still hung at the far side of the room, as though he couldn't force himself to get any closer to the corpses.

She righted herself to the table's axis, watching the slow dance around her of things she had dislodged—empty containers with crusts of dried food at their lips, a stain-dulled knife, a long slender bone... she thought it looked like an ulna. She caught the drifting knife and jerked it out of the air. "What do... what do you think killed—did they die from?" Hating herself as she asked it.

"Starved, probably. That's what it usually is." The words were very soft. His arms folded over his stomach in what she took for empathy. She remembered that he must have seen this sight over and over while he had prospected with his father. He didn't say anything more; she watched him track the rising arc of the pale bone's dance, end over end in the air.

"Who were these people, anyway? Who would live in a... a garbage dump like this, never throwing anything away? Were they insane?" Still trapped in the fascination of the bizarre, she was dismayed by her own inability to close her eyes or look away.

"Of course they were. What the hell else would they be?" His voice was thin and hard, a drawn wire. "Just like we were for coming here. There's nothing here. Let's go."

She glanced back at him, surprised. "But we just got here. Look, there are other rooms—" She gestured toward the walls of rubbish, other dark, narrow mouths opening on other unknowns.

"Forget it. They won't be any different. There's nothing in this hole but death and garbage." He began to pull himself toward the entrance.

"Damn it, I worked my butt off getting us here! We're not leaving until I'm sure there's nothing else." She brandished the knife, forgetting she still held it.

His body whiplashed with angry surprise, or maybe with fear. She let go of the knife, pushing it away from them both, embarrassed. She moved off in another direction, toward the first of the openings. Looking back as she reached it, she saw him still motionless where he had been. "Well, are you going to help me?"

He shook his head, his helmet winked in her light. His arms still pressed his stomach. "No. If you want to wallow in it, go ahead. Not me."

She turned back wordlessly and pulled herself into the opening.

The room beyond was crammed with more printouts, leaving her only enough space to turn around with claustrophobic eagerness and push her way out again. Chaim drifted, watching, as she moved without comment to the next hole. Beyond it was more paper, but she also found numberless

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copies of prewar pictorials neatly stacked in boxes. She tried to pull one free, wondering whether they might have historical value; only to find that the pages had fused together from some chemical reaction between the synthetic paper and the ink.

She dropped it in disgust, a memory stirring in her mind like dust disturbed: *Recluse.* She had read about people like this, and that was what they were called; people who withdrew physically as well as mentally into their own private world. The terrible exhilaration of that crippling fear tingled her skin—the ultimate in freedom, the ultimate in security, the ultimate womb of this place. She kicked off from the side of a box, diving back into the narrow exit-hole.

She passed Chaim still silently waiting, pulled herself through the last of the dark holes into the last claustrophobic room. This one was not as crowded as the others; there was still enough room for her to move a few meters through a sphere around its perimeter. Its quality was different, too: a wilderness of tangled, broken furniture, stuffed with rags of ancient clothing, jammed with trunks and boxes. She pried the boxes open desultorily, poked among the furniture legs for anything that might have some real value.

Light leaped back at her unexpectedly, prisms with color, as she opened a small trunk crammed beneath a desk. Her breath caught, her fingers dug into the color, droplets of congealed rainbow, gold and silver made molten by her violence. She brought up a necklace set with sapphires the size of peas, a ruby as big as her thumbnail, diamonds... *glass.* They had to be glass, paste, imitation. Her scintillating joy went out, leaving her empty and dark again. Find a treasure, in this squalid midden? She could as soon expect to find the sun shining. Dargnagan was right, there was nothing here worth wasting their time on; it was only her own stubbornness that had kept them here this long.

But her hands moved through the jewelry again, making it float and spiral, winking at her with secret knowledge as she set her fantasies free and dreamed for one brief second that all of it was real. At last she chose two favorites out of the dance; the time-stained, gem-hung necklace, a golden man's ring studded with fake rubies and far too massive for the fingers that closed around it. She carried them with her, leaving the rest to resettle into stasis as she left the final room, defeated.

"Find anything?" Chaim's voice was too weary to carry sarcasm.

"Junk jewelry." She held the pieces up in her fist, defiantly. "My claim. There's more in there if you want to pick it over."

"I just want to get the hell out of here." He disappeared into the glacier mass of printouts.

She followed him through, and back along the corridor of dark stone; he was already waiting in the lock when she reached its end. They went through it together, and she watched him throw himself against the wheel like a man with death at his heels. He reached the *Mother* ahead of her in a reckless outward leap, almost closing her out of the ship's lock in his impatience.

He peeled off his suit and left it hanging in midair, slamming away and up through the levels of the ship before she could get out of her own. Following him upward, half curious and half concerned, she listened in the emptiness outside the closed door of his cabin, and heard very clearly the sounds of his retching.

She waited until there were no more sounds, and rapped on the door. "Chaim?" There was no answer. She pulled the door open, and entered his cabin for the first time. "Chaim?"

He looked up at her from across the room, where he clung to the doorframe of the bathroom entrance, doubled over in what looked like prayer. But one sight of his face told her that it was pain, not worship, that humbled his flesh.

"What's wrong?" She was suddenly frightened for them both. "Can I help you?"

"Pills... in that drawer." He stretched out his hand, a gesture and a plea.

FOOL'S GOLD



She moved across the room and opened the top drawer of the cupboard, hearing the magnets snap. Inside, drifting up from a nest of clothing, she found a large, half-empty bottle of pills, plucked it out. "Antacids? These are just antacids—"

"Give them to me!" His hand flagged her frantically.

She carried them to him; he fumbled for a handful, spilling them out into the air. He ate several at once, chewing, grimacing, swallowing. "Damn! Damn..." He pressed his ash-colored face against a rigid arm. "God, I don't want to start bleeding!"

"What is it? For God's sake, Chaim, tell me what it is!" She shook him.

"My gut. My ulcer."

"An ulcer?" She let him go. "You have an ulcer?"

He nodded.

"Shiva! Why didn't you tell me!"

"Why? he gasped, not looking at her. "What was the point?"

"Because it's a danger—to both of us!" Her hands pulled at the cloth of her jumpsuit in sudden empathy. "Don't you have anything stronger than that?" The antacid pills and bottle were searching for the floor.

"I couldn't afford it."

She bit her tongue; said, as quietly as she could, "Do you think it's bleeding now?" She had read only a little about ulcers, enough to understand his fear: A perforation could be fatal without medical treatment.

He shook his head. "No sign when I... No. But it gets worse and worse. I never hurt this bad before."

"What we just saw in there: I didn't know it bothered you so much. I thought you saw a lot of that kind of thing, before—" breaking off, totally uncomprehending.

"And I always hated it! I still hate it. I hate going on and on, never finding anything worth a damn. And always alone—" Tears welled in his eyes; she watched incredulously as they overflowed, spreading across his face in a shining film. "Like those crazy bastards down in the rock, drowning in garbage, dying by centimeters—just like this goddamned system!" His body spasmed with pain and frustration.

"But we're not like them." She remembered abruptly the strange twisting of emotion that had caught her soul there in the dark entrails of the rock.

"We're worse. We had a chance to be a team; more than a team, a—" He looked up again at her, and she stopped the word with her eyes, as she had stopped it once before.

"No. Never." Her own words shivered and paled abruptly. She shook her head, needing her whole body to force the motion. "Not after that happened." She turned her back on him, no longer able to keep her eyes shielded. The bare ivory-colored walls of his cabin seemed to blur into infinity. "You knew that."

"You 'knew' it! You wouldn't give me a chance. That's why this could never have worked, even if we'd found something—" His breath hissed between his teeth. "Get the hell out of here, then. Let me be alone by myself."

She went out of the room, slamming the door to, and fled across the narrow well into her own cabin. She huddled there, eyes closed, clinging to the brace beside the door; burying herself in the deeper blackness of her mind until she lost all track of time. But still the light was waiting for her, she knew that it waited—in this room, or beyond its door, or among the million stars burning endlessly in the depths of night. She was alive, she could not escape it, she had only to open her eyes to see the light, acknowledge it, commit an act of faith. And to open them was in the end easier than keeping them closed. She opened her eyes, blinking painfully in the glare.

**S**HE RELEASED HER DEATH-GRIP on the metal, pushed away from the wall toward the trunk by her bed and bedroll. In it were the few possessions she was never without, among them the small trove of her

Old World book translations—the keys that had set her free from the solitary confinement of her life and let her share other minds, other worlds. She unfastened the lid and opened it, searching through the shifting, rising contents as carefully as she could. At last her hand found the one book she wanted, the one she had not touched since the moment when Chaim Dartagnan had put it back into her hands during their reunion on Mecca.

She opened it, watching its pages ruffle effortlessly in the cover's wake. She separated them hesitantly, randomly, hanging in the air. Her eyes caught an old familiar phrase from this essay, a paragraph of that one, the notes she had scrawled in answer in the margins. She pressed aside one more page, and her eyes fell to the lodestone of a stranger's writing below her own. She had written, *It will be lonely to be dead; but it cannot be much more lonely than it is to be alive.* And answering her, the stranger had written, *Yes, yes, yes...*

The book drifted out of her strengthless hands; she felt her own face grow slick and warm with tears. She cried as she had not cried in longer than she could remember, filling the empty room with lamentation, for all the times that she had held life at bay, taking the world's contempt into herself and letting it wound her. She wept herself to exhaustion and beyond it, knowing as she wept that she would never wash away the last grain of her regret.

But at last her body grew light enough to overcome its own inertia; she went out of her room and crossed the hallway. She tapped softly, and more loudly, on Chaim's still-closed door, getting no answer. She pushed the door aside. At first she thought the room was empty; until she saw him buried in the cocoon of his sleeping bag, tethered to the frame of his bed. She crossed over to his bedside, making certain that he was only deeply asleep.

Setting back in the air, her arm loosely through a hand-hold, she watched him sleeping; able to observe him without being observed, laying down her shield at last in the face of his defenseless sleep, able to see that the past was past: the mistakes paid for, the wrongs righted, as far as humanly possible. She had let the past fill up the present until there was no room left for a new life, for tomorrow. Who was she punishing besides herself? And why? And when would she have suffered enough... *Oh God, is there anyone alive who doesn't hate herself—himself* (looking down at Chaim's sleeping face)—*in their deepest heart? Just by living we betray ourselves and are betrayed... And only we can end it.*

Chaim stirred toward waking; the sleeping bag strained against the fastenings that held it immobile.

"Chaim." Her voice shook him gently.

His eyes opened, stared blankly at the ceiling.

"Chaim—"

He turned his head, body and bag revolved toward her. The blank look stayed on his face as he registered her presence. He looked at her, saying nothing; his eyes were red-rimmed.

"How are you?"

He grimaced, at her or at himself, she wasn't sure. "I don't know."

"I'm better." She glanced down. "Better than I've been in a long time, I think."

The incomprehension returned, chill with resentment. And yet somewhere an ember of understanding still strained toward fire.

She breathed on it tentatively, afraid of being left alone in the darkness now. "I found what you wrote in my book."

Slow surprise filled his face. "Yeah?" He pulled himself part-way out of the sleeping bag.

A nod. "When you're lonely, you feel like you're the only one." She twisted her hand around the support bar.

He laughed softly, unexpectedly. "You are."

She let her mouth relax, and found that it began to smile. She put her free hand up, feeling the strangeness of her face, the smile's distortion of it, the puffiness that remained of her grief.

"Chaim—I don't hate myself, any more. Not the way I've hated myself since Planet Two, at least."

He plucked at the seal on his sleeping bag, separating his cocoon. "Does that mean I can stop hating myself, then?"

She blinked. "Yes... I suppose it does."

He searched her eyes for her meaning, and she answered him, no longer afraid. He pushed up from the bed, a man released. "Partners, then?" He reached out to her.

She nodded; took his hand and squeezed it briefly before she let it go. Warmth stayed in her palm.

He crossed his arms gingerly against the front of his coversalls, looking up toward the ceiling at space. "So where do we go from here? Where do we look, what do we try next?"

She jerked abruptly at the handhold. "Damn it! I'm not ready to face that now, too."

"We've got to face it, sooner or later. It's better if we do it now." He unzipped his pockets and pushed his hands into them. "Everybody in creation's been over the Main Belt with tweezers. We don't have supplies enough to keep random-searching for as long as it'll take to hit a strike. We've got to think of something better."

"There must be something nobody's tried, something everybody's overlooked, for some reason. Like the station on Planet Two that Sekka-Olefin found." She turned, following his drifting motion out into the room. "Chaim, you're the prospector; isn't there something you heard about, some clue?"

"That's the point—I'm not such a damn great prospector, Mythi! Neither was my old man. He had lousy luck; even when he made a strike, it killed him. And I never learned half of what he knew." His eyes grew distant and opaque. "Except... I do remember something. I told you back at the start, he had a lot of wild get-rich schemes. And there's one that didn't sound as crazy as the rest... about that factory rock from the Demarchy, that just disappeared during the war. Nobody ever found a trace of it, they all figured it must've been hit with a nuke barrage that kicked it clear out of the system. But the odds are against that; it takes a lot of energy to give escape velocity to a rock that big. There was a whole atomic battery plant on it. It was..." he frowned, concentrating, "let's see... my father said that even if it was knocked out of the fore-Trojans—and it must've been, since they would have found it by now if it was still there—if it was, then its orbit should still have similar elements. That means it would drift around the Belt over a gigasecond or so, and it should've been spotted again eventually."

She frowned, concentrating. "So either it was completely fragmented or it did leave the system."

"Unless somehow it got trapped in another equilibrium point."

"But the only way that could have happened in so short a time would be if it was hit twice, or collided with some other rock." They looked at each other and she felt their fantasy building, layer on layer.

"The most likely place would be in the other Lagrange points."

"Right, and probably a stable one—"

"The aft-Trojans," he finished it for her. "It could be there right now, as good as new." He looked up as though he actually expected to see it.

"As good as new?" Her face twisted.

"Let's face it, if the factory itself took a hit, the reactor would probably be spilling radiation. You couldn't miss it. But nobody ever reported anything like that from the aft-Trojans. If the plant was blown up, there wouldn't be much point going after it; but if it wasn't... We could buy the whole goddamn Demarchy with that find!" He rubbed his hands together.

"How would we even find it, in the whole of the aft-Trojans?"

"They were mostly uninhabited, anything with any man-made stuff would stand out in the readings. That signal

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separator Fitch gave us could be just the edge we need for this."

"But even the core Trojans are spread over a hundred and forty thousand kilometers—" She pictured them in her mind, their tenuous teardrop spread veil-thin through endless vacuum.

"I didn't say it would be easy. It's probably not even there; this whole thing is insane. But you wanted a long shot, and that's the only one I've got. It's either shoot our wad on this or go on the way we have, bleeding to death." He shrugged.

"Your choice is mine. What do you say?"

She took a deep breath. "What the hell. Let's gamble, let's throw it all away on the Trojans! What the hell have we got to lose?" She raised her arms and swept them down, rising defiantly through the air.

He nodded, his eyes shining. "Only our chains."

"Nothing." Chaim looked up from the readouts. They had been in the aft-Trojans, sixty degrees behind Discus, for more than two megaseconds. And so far they had found nothing that should not have been there; no trace of radiation or any material that had not been formed in the original fusion of stone out of primordial dust.

Mythi sighed, saying nothing because she could not think of anything to say. She finished a handful of nuts, feeling the presence of every hard, broken fragment prick the tight walls of her stomach; they had begun rationing their supplies to stretch their search time. *Wasted time.* She tried not to think it, and failed.

"You want to check out its twin?" He twisted to look directly at her. "There was something in the long-range scan; I'm not losing my mind—" as if he wasn't absolutely certain of it himself.

She shrugged. "We're here; we might as well." The kilometers-long piece of stone below orbited a common center of gravity with a larger mate she could see shining, a spurious star, above the bleak, dead mass they had just close-scanned.

She altered their course again, feeling the delicate mastery of her skills that she had regained and enhanced these past megaseconds. This was something that used her abilities fully, challenged them, honed them. But soon it would all be gone. She didn't regret the decision they had made in gambling on the long shot; but she did regret that it would do them no good—that the satisfaction of this moment would only leave her more hungry, when their last chance and this ship were gone.

They closed with the second planetoid. Chaim put the results of the reconnaissance scan on the screen almost perfunctorily, below the actual view of naked stone framed in the ship's viewing port. A binary... it was hopeless, the original factory had not been part of a binary system. Their long-range instruments must be going bad on top of everything else. She watched morosely over his shoulder as the readings began to appear, lining up as she had learned to expect them, high in iron and nickel ores. Anticipating zero on hydrocarbons and metal alloys, she looked out at the barren space below them before she saw the actual figures. She blinked, and looked again. "Chaim." She reached out, her hand brushed his arm—unthinkingly.

He glanced up. "Oh, God," he breathed. "Oh, God..." His arm knotted and trembled. A pragmatic, colorless dawn was breaking across its surface; the growing light glanced from the bristling discontinuity of towers and domes. She tore her eyes away from the sight of them: The readings continued to come, and looking down she saw that they were not zero any more.

"Ninety-five," Chaim murmured. "Look at that! Look! We've found it! We've found it! Geez Allah, we're rich!" He caught her hand, pulling her toward him, sending them out in a spin until they rebounded from the control room's ceiling. "He

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was right, the old man was right, God damn him... he finally did something for me!"

She heard her own laughter echoing through his shouts, echoing through the ship—her own laughter, as alien as a voice out of deep space. Chaim's arms wrapped her around, she felt suddenly as solid as steel, as ephemeral as bubbles. She pulled his face toward her own and kissed him.

He stared, speechless, as she broke away again. He kissed her back, eyes closed, arms tightening, pressing himself against her with sudden urgency.

She broke away and struggled back toward the panel. "I—I'll take us down." She felt her blood sweep to the ends of her body and recoil through every artery, capillary, vein; dazed by a feeling as strong as terror, that was not. Her hands stumbled over the instruments.

Chaim nodded at the back of her head, clearing his throat. "Sure. Let's see what we've got." He settled down to the instrument panel beside her, his voice husky. "Look at that; there's no radiation leaking at all. It must be in perfect shape!" He grinned, abruptly reoriented.

She nodded, feeling her own excitement change form again as she looked down at the readings beside him. She saw the figures twitch unexpectedly on the screen, still plagued by the random energy fluctuation that had been with them from the start. It struck her as ironic that after a gigasec this factory was in better shape than their own equipment. Her eyes tracked on across the readings, caught again. "Chaim, look. It looks like there's something in orbit here besides us."

"Another ship?"

She nodded, pointing at the screen.

"Showing any power?" He peered past her.

"No..."

"Hm..." He let himself drift again abruptly. "Must be a derelict; doesn't look like much. We can check it out later, see what's left of it. But first I want to see that factory!"

She didn't argue.

**S**HE BROUGHT THE SHIP IN as close to the source of their readings as she could, handling the difficult rendezvous with only half her concentration. They went through the ritual of suiting up, emerging through the lock onto the airless surface of another unfamiliar world, seeming to move through it all for first time. The planetoid rolled sunward into another fleeting day, and the light of distant Heaven silvered the razed stone surface of the docking field, limned the eerie insect-silhouette of the *Mother* behind them—etched the shining reality of the factory up ahead against the black surface of the sky. It seemed to grow out of the stone itself, an iceberg jutting above a frozen sea, the greater part of its plant buried beneath the surface. Beautiful, incongruous, immense—flawed. Unfamiliar with its form, still she recognized the gaping, unnatural breach along one side: "Chaim, it looks like it did take a hit."

"I know. But there's no radiation." He repeated the reading like a prayer. "The reactor has to be intact. That's still worth a ship and then some... it's still worth plenty! And look at the waldos, they haven't been touched. I know a factory back home that'd pay a mint just for those."

They crossed the distance toward the factory's evaporating shadow in bounds that seemed effortless, her body as light as her spirits. The airlock that faced on the empty docking field gaped open in a cry of perpetual astonishment; but this time the morbid image did not stay in her mind. They passed on through it into the factory's fractured cavern.

Near the entrance their spotlights picked out the broad access tunnel that led down into the planetoid's insulating heart, where the factory's hundreds of workers had lived before

the war. Passing it by, they moved on into the plant itself. Dim illumination suffused the interior from the broken wall to their right, and gradually their eyes adjusted to the darkness. Looking up, Mythili saw cranes and unnameable appendages dripping like stalactites from the ceiling high overhead, the shadowy walls and partitions that broke the space into a maze of soundless mysteries through which they drifted like lost souls. "Do you know where we're going?" suddenly uncertain. "What are we looking for?"

Chaim nodded, ahead of her. "More or less. I almost worked at one of these places; they gave me an orientation. I want to see the reactor, and what kind of damage there's been."

Mythili glanced down at the radiation counter at the wrist of her suit. It still registered nothing; she followed his slow, searching progress without further questions. The light grew stronger as they neared the ragged break in the dome's fragile outer shell. She found herself wondering that a hit which had apparently come so close to the reactor itself had not damaged it enough to cause even a small leakage.

"Watch your step—" Chaim was silhouetted as he bounded up and over the heap of rubble from a collapsed wall. She followed him like a dancer over the shifting surface, saw him turn sharply left through a breach in a higher, heavier wall.

A sudden shout rattled in her helmet as he disappeared from sight. She threw herself forward in a long bound, and another, until she could see him again. He was struggling to get to his feet again, where he had fallen in another pile of girders and rubble. But just beyond him was the thing that had wrung the cry from him—a vast hole opening in the surface of the vaster floor.

Mythili caught a protruding end of beam, pulling herself up short at Chaim's side. "What happened?" not directing the question at him, but at the hole beyond him.

"It's gone." His own thoughts followed hers to the rim of the pit. "The reactor—it's gone!"

She clung harder to the beam-end, strangling the useless words that tried to form in her throat. *Why? Where? Who?* "How?" She voiced the one question that she could possibly imagine having an answer.

"I don't know. I don't know..." Chaim muttered, drawing himself up. "God help me. But this"—he waved a hand at the blasted wall—"must've been done on purpose, for a way to get the thing out of here. Maybe the blast was what slowed the rock down enough to trap it here. They must've been in a hell of a hurry to rip it out the hard way."

"Then you think someone found this place after the first attack, and—stole the reactor out of it?"

He grunted. "Yeah."

"But what happened to it? Why wasn't there ever any record of it?"

"I don't know. If it happened during the war, it could be nobody ever knew it happened. Maybe the reactor's in use somewhere in the Demarchy right now. Or whoever stripped it might have got blasted themselves, and the thing was lost forever. All we need to know is that the goddamn thing is gone!" He wrenched loose a piece of metal and hurled it. She watched its slow, graceful arc outward and down beyond the rim of the hole.

She bit her lip, feeling her own emotions stretched beyond the limits of control, beginning to break loose and recoil. "But the rest of the factory is still here!" She threw that undeniable fact in the face of her breaking courage. "There must be other things worth salvaging, that some factory could use—"

Chaim turned back to her; she searched behind his faceplate glass. She heard the long, slow intake of his breath. "Maybe there is. The exterior waldos we saw as we came across the field; they looked intact. The factory I told you about—its waldos were damaged. If we can get these clear, we just might be able to sell them for our own ransom. Nobody else's got replacement parts to offer."

"I do." A third voice, a stranger's, filled the captive space of



their helmets.

Mythili shook her head in disbelief, until she saw the perplexed look that Chaim gave back to her. Together they turned, found a figure standing, impossibly, behind them. A shudder crawled up her spine as she imagined that she saw a spectre from the dead past, a ghostly guardian seeking vengeance on the violators of a tomb.

"What the hell..." Chaim whispered. "Who—?"

"Don't tell me you've forgotten me, Chaim. It wasn't so long ago we met, back on Mecca. I'm your father's friend, and yours, boy."

"Fitch!" Chaim shook his head, uncomprehending. "What in the name of God? How—what are you doing here?"

"Following you. You don't think this was a coincidence, do you?"

"You tracked us all this way," Mythili was already sure of the answer, sure there could be no other explanation. "The signal separator—that 'gift' you gave us, back at Mecca—it was bugged, wasn't it?"

Fitch came toward them, his face still invisible to her. "You're a bright girl," mildly.

"A stupid fool, not to have realized that power leak meant something." The accusation stung only her. As he approached she saw that he carried something massive at his side, something she couldn't identify.

"What were you following us for?" Chaim asked, although the answer was as clear to her as the answer to *how*; and probably it was to him, too.

"I told you before, Chaim: I knew your father. I knew he was smart—I knew he'd leave you something, a key, a clue. I knew you weren't going out on this survey without a real goal in mind." She could see his face now, familiar, shining with sweat. "That was smart of you, trying to throw anybody who suspected off by spending so much time in the Main Belt. I almost had to give up on you, I didn't know if my ship could take it; it'll never make the trip back to the Demarchy from here. But I didn't give up. And now after all this time, it's finally paid off. . . I'm going to be a rich man." He pulled the thing he carried forward.

"Look," Chaim said shortly, and she heard an edge of nervous fear on his truculence. "I told you I'm not taking on more partners. Just because you followed us to this claim, doesn't mean we're going to cut you in on it."

"I didn't figure you would." He brought the thing up in front of him; Mythili recognized it at last as a portable laser cutting torch. Her lungs were suddenly tight and aching.

"Fitch—" Chaim raised his hands, placating, surrendering.

"Don't bother with it, Dartagnan. I saw your testimony against Siamang; I know you'd promise me anything now, and try to turn me in later. I'm not giving you the chance to do that to me."

"What does that mean?" Chaim said, knowing what it must mean.

"It means he's going to kill us, and pirate our claim." Mythili moved forward a little, painfully aware of the uncertain footing and the pit behind them. "Fitch, listen, *listen* to what I just said. You don't seem like that kind of man, not a murderer, not a thief. We never did anything to you. You're not that greedy. And you said Chaim's father was your friend—" amazed at the quiet reason in her own voice, somehow functioning without the control of a conscious mind that was white with the fear of death.

Fitch laughed once; there was something in the sound as desperate as their own terror, and as unable to believe that he was actually doing this to them. But he shook his head at her, and the quiet torch in his hands did not waver. "We weren't close. Besides, I think he'd understand. He'd understand that a man who's spent his life in space gets old before his time. And when you're getting too old and your ship is, too; when in all your life you've never made a find that's done more than just keep you alive to go on searching; when you know you're born

unlucky, you'll die old and poor and alone—when you know all that, and you see two healthy young kids get handed a ship and go out to make a rich strike—"

"—you go a little crazy," Chaim finished softly.

"No!" Fitch said. "You finally get sane. You realize the truth, that you're the one you have to look out for. I lived inside the rules all my life, and what did it get me? Nothing! Now I make my own rules. Nothing else matters—you don't. Don't waste my time with talk," as Mythili tried to speak, "just start backing up." He gestured with the laser.

She glanced over her shoulder. They were less than two



meters from the edge of the gaping reactor hole, its lips bearded with overhanging rubble. They would fall into the pit, not a fatal fall, but the rubble coming down on top of them would bury them forever. Her eyes leaped from a piece of twisted metal to a chunk of concrete, searching for a weapon—all the while knowing that there was nothing she could do quickly enough to save herself or Chaim from Fitch's torch.

Chaim moved abruptly beside her, not moving back but toward Fitch, his hands still outstretched. She wondered with sudden disgust whether he was about to beg for his life. But before she could even finish the thought he stumbled, sank to his knees in the broken masonry.

Fitch swore, and the nose of his laser torch dropped slightly, following Chaim down. "Get up." His attention flickered between them.

Chaim thrashed awkwardly, starting a slow cloud of debris. Mythili wondered at his inability to get his equilibrium back, wondered if he was that frightened. But then in the space of a heartbeat he was up and moving—on a collision course with the weapon in Fitch's grasp. "Mythili, get out!" The shout spilled over into movement, impact, a chaos of input, a crack of lightning. She threw herself backwards as the laser flew

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off-track, firing, slashing through the space where she had been and dazzling her eyes to tears. She heard more grunts and cries; blinked furiously, trying to force sight back into the dark-bright mottled space inside her head as she groped in the debris for a metal bar. She pulled one free at last, pushing herself upward. The periphery of her wounded vision showed her the two men struggling to keep from being overbalanced in the soft sea of rubble. The intermittent, bloody streak of the laser beam lashed the darkness. Fitch's knee caught Chaim in the stomach, thrusting him backwards, tearing his hands loose from the torch.



As Fitch recoiled from his own thrust, rising in the air, he brought the torch's ruddy beam back into line. Mythili hurled the bar, her body's reaction to the movement distorting her aim. But still the bar struck the torch, knocking it out of Fitch's hands, and sent it spiralling lazily into the air. The red beam roved, pointing like the finger of God, and she realized that the dead-man switch had jammed. "Look out, look out—I!" She threw her hands up, pressing her helmet glass...watched helplessly as Fitch tried to maneuver himself out of its path, and failed. Still in mid-fall, with nothing to give his frantically twisting body support for a counter-motion, he cried out as he saw his own weapon turn against him.

The stream of intensified light stroked down across him in an idle caress, laying open his suit, searing the cloth and flesh beneath it; releasing the captive oxygen, the artificial ecosystem that kept him separate from the vacuum outside. She heard his scream start, lost it in the rush of escaping air that saved her from hearing its end.

Chaim pushed off as the falling finger of light reached out for him in turn, rebounded sideways before it found him—kept on tumbling, as the debris shifted under him, spilling him toward the pit.

"Chaim!" She screamed this time, screamed his name as Joan D. Vinge

she saw him slide toward the edge. He clambered over the shifting face of the rubble, a grotesque slow-motion pantomime of a man trying to walk on water. A chunk of cement struck him in the chest, cancelling his frantic upward momentum, throwing him back.

She bounded forward as she saw him fall, doubled her own momentum as she landed at the shifting lip of the pit and plunged recklessly out and down. She matched Chaim's free fall, catching frantically at his leg as she dropped past him. Her body wrenched, and together they went on falling through the crest of the avalanching metal and concrete, to a collision with the bottom of the pit. Her feet struck cement with an impact that ground her teeth, and bones grated on cartilage.

"Move! Move—" She didn't need Chaim's garbled shout of warning to go on collapsing over her feet, to push herself off again across the floor of the pit in a blind leap. He followed her through it, and together they came up against the far wall in another jarring impact, as behind them the falling rubble made inexorable silent thunder. She settled at the wall's foot, sank down in pain and exhaustion, not letting herself turn back to watch.

"Thank God," Chaim said thickly, crouching strengthless beside her. "Thank God you didn't run."

She looked up at him, and suddenly her own body was trembling uncontrollably. "You fool! You damned fool! What did you do that for? You threw yourself right at him, it's a miracle he didn't fry you! What the hell were you trying to prove?"

Laughter seeped into her helmet, thin and gray; she listened in disbelief. "I can't do anything that suits you." He pushed himself up, rested a hand on her shoulder. "I guess I was trying to prove that—that what happened on Planet Two would never happen again."

She drew him toward her, felt their bodies touch, suit to suit. Their faces met, glass to glass, in silence.

**T**HEY BURIED FITCH in the abandoned city below the factory: the only inhabitant in a City of the Dead. She listened with uncertain emotion as Chaim spoke a benediction, calling Fitch a symbol of all Heaven's humanity and the thing that had killed him symbolic of how it had destroyed itself—not through technology, but through misguided greed.

And then with the ship's salvaging equipment, they cut loose the waldoes of the ruined factory and lifted them away. Clutching the prize in spidery arms, the *Mother* began a homeward course, tracking back through lifeless wastes toward the Demarchy's still-beating heart. Chaim did not try to force the closeness she could not ignore between them, although she felt his longing, and she was grateful. She felt no need either to pull away or to draw close before she was ready, and her gratitude at his understanding drew her closer in spite of herself. And while the journey outward had seemed endless in its solitude, their shared return slipped by her like a soft afternoon, as the past fell farther and farther behind.

They made radio contact long before they reached Demarchy space, reporting their find, anticipating their reception and not disappointed by the eagerness of the response. But as they neared Calcutta planetoid Mythili felt her tension rising again, without a clear reason.

"Mythili... something's bothering you," Chaim studied her earnestly across the trays of food on the metal tabletop. His own appetite had grown cautiously hearty, while she sat picking at her sticky mixed vegetables and rice like an unhappy child. "What's wrong?"

She looked down from the droning videotape recorder they had installed on the wall beside the table. "Nothing," unable to say anything substantial.

"Don't give me that. Tell me what it is—something I've

done?"

The dismay on his face surprised her so much that she laughed without meaning to. "No. No, it's not you, Chaim. It's just... I don't know. I just—hate having this end, I think." The laughter flinched. "It's ironic; I hated this trip, this ship," you, but she didn't say it. "so much on the way out; and now I hate the thought of it ending."

"Do you?" The absurdness of the emotion on his face didn't change, although the emotion itself did. "But this isn't the end—it's just the beginning. We've got the ship now and forever. We're free—"

"Free to end up like Fitch?" the words burst out of her, and hearing them she recognized at last the source of her unhappiness.

He sat back, grimacing; as though the idea had only just struck him. But he shook his head. "No. It won't be like that. Because..." he hesitated, "because it's not so much the money, or the lack of it, that made this trip better, more, than the trip out. It's the fact that we're sharing this one." His fingers pressed the table-edge. "Hell, if we have to, we can haul gases with this ship to make a living. But I figure we'll always be able to get by on prospecting, if we want to. And I want to: A find like the one we made this time—it means something. Not just to us, but to the Demarchy. It gives everybody a little more time." His eyes grew distant. "If that damned reactor had only been there!"

She felt a shadow fall across her own mind, realized that after what she had seen in the Main Belt, she was beginning to believe him. "You think it would have saved the Demarchy?"

"No... I don't know... it would have helped. And with the money we've got out of it, I could've done what Sekka-Olefin wanted me to do: sold the Demarchy on moving its people to Planet Two."

"You still believe in that crazy old man's crazy ideas?" Her voice rose slightly.

"It makes a lot of sense!" Sharpness answered her own. "He told me it's no worse than parts of Old Earth—no worse than Antarctica, and people live there."

"Antarctica!" She shook her head. "Antarctica's an icecap; didn't you know that? He was right... Planet Two's just as bad."

"But it's a world, like Earth—" He leaned forward. "You don't need the same sort of artificial environment we need in space—you don't need the technology, you don't have to make everything. Air, water... you have all you need. It's a natural environment."

"All the food? The heat?" unable to keep the words neutral. "Do you really think it would be any easier to survive on Planet Two than out here? It's too cold. The only reason people could live in Antarctica was because the rest of Earth had a better climate to support them—no one lived there before Earth had a high tech level."

"How do you know so damn much about Earth, anyway?" His exasperation prickled.

"My books. You've seen them—" She was able to say that, at least, without rancor now. "Remember that ecology book I gave you; didn't you get anything about 'natural environments' out of it?"

"Not much." He looked down uncomfortably. "I had other things on my mind... You really think it's impossible? You think I'd be leading the Demarchy from one bad end to another one? You really think Sekka-Olefin was crazy, he didn't know what he was talking about?"

She nodded. "It was a fool's dream, Chaim. Something to keep him from going mad, stranded there all alone." She gentled her voice at the sight of his face. "Read the books yourself, if you want to be sure."

His head moved from side to side. "But he wasn't wrong about what's happening to Heaven, to the Demarchy—to us. That we'll all die, in the end. If we can't start a colony on Planet Two, there's nowhere left to run. There's nothing anyone can

do to stop it... only try to hold back the night as long as we can. Doing what you and I are doing: at least that's something." He turned a can slowly on the surface of the tray, staring down at his hand, at the futile motion.

"Yes." She nodded, feeling a great heaviness settle inside her, knowing that it would never lift again as long as she lived.

"I guess—maybe it is worthwhile to go on with prospecting. I guess we can manage together. We make a pretty good team after all." Forcing a smile, she found that suddenly it felt real.

An insistent chiming fell like coins down through the well from the control room, signalling their final approach to Calcutta. She unsealed a pocket on her jumpsuit and reached into it, pulling out the jewelry she had found in the nameless planetoid that had turned their lives around. Separating the ring from the necklace she held it out to him.

"Here," speaking with a cheerfulness she barely felt. "A memento. We might as well look like rich SOB's for once in our lives. Even if it is junk, this may be the only time we'll be able to carry it off."

He laughed, grateful for the change of subject. Taking the heavy ring without reluctance, he turned it between his fingers. "Whoever owned this must have massed a ton." He poked a finger through the hole, with room to spare.

"Maybe they wore it over a suit glove." She untangled the necklace's gaudy, jeweled pendants, shaking her head. "Anyone whose taste ran to this sort of thing would be tasteless enough to wear it outside."

"Maybe it's an antique. The Old Worlders were a lot heavier-set." Chaim squinted at the inside of the ring hole. She saw him straighten and shift suddenly, bringing the ring up closer to his eyes. "Myth... tell me what you see inside here." He passed her the ring, so intently that she wondered whether he was playing a joke on her.

But she took the ring, holding it up into the light. Her own hands froze as she made out the small, worn symbols on the inside. "F-fourteen karat?" She looked up at him, her eyes still straining. "It's real?" "breathless. 'Shiva! It can't be—' Flumbling, she picked up the necklace, chose a depending clear-colored stone and pushed it across her watch crystal. She felt it scrape, rubbed her fingers over the furrow it left behind. "And there's a whole trunkful of it out there."

"My God." He struck his forehead with his hand.

"But once we've sold the waldoes, we'll be able to go out again and get the rest." She held the necklace up, watching it wink languorously in the air. "Maybe it's not worth much against the darkness—but there are still enough blind, rich SOB's who'll buy it anyway to keep us bankrolled for quite a while." The thought gave her a perverse pleasure.

Chaim grunted, sharing her irony. "You can count on it."

His eyes darkened again as he turned the ring on his finger.

"All of it real..."

"Chaim?"

He shook his head. "Nothing. Just thinking about fool's gold... and fools' dreams. Mythical—" He stretched his hand until it covered one of her own. "Maybe this is too soon. But I have to say it now, before... while I've still got some privacy..."

She looked down at his hand, back at his face, wondering at his sudden inarticulateness. "What is it?"

"Myth... I want to get married."

"What?" She blinked, and blinked. "Married? To whom?"

"You, damn it, who do you think? I know, I know!"—he ran on before she could answer—"it's too soon. I'm not trying to rush anything, it's your choice, it always was... I just wanted you to know, that's all. That I... that I mean it." His hand tightened.

She freed her own hand nervously, curling the edge of her collar. "You know I'm sterile. I can't ever have children—" A choking knot kept her from saying more.

"I know. That's fine with me. I don't want any children; I don't want to bring them into a world without a future."

FOOL'S GOLD

"Then—why? Why get married at all?"

"Because it's a commitment. A promise that I'll remember there's something worth living for right now, even if there isn't any future. Our own lifetime doesn't have to be so bad, if we make the most of it. And because—" he caught her eyes, "—because I guess I love you, Myth." He took a deep breath.

She glanced down, weaving her fingers together, twisting them, testing the fit. She looked up again, her throat aching, still unable to speak the words that had been prisoner too long inside her; hoping that he could read in her eyes the promise he, Chaim. But I'm not saying *no*." She untangled her fingers, and gave him her hand freely.

He grinned. "Damn—I can still sell an idea when I want to."

They left the ship at last, trailing the long guide rope down to the surface of the Calcutta docking field. It was cluttered with corporate mediamen and freelancers; the din of questions blurred into white noise in their suit speakers. But a single figure stood waiting for them as they forced their way through the gauntlet of questions. Mythill saw the insignia on his plain, dark pressure suit, the silver octagonal star enclosed in a teardrop, the symbol of the Demarchy. Chaim glanced over at her, murmuring, "Abdhialmal?"

She nodded. She pictured his self-satisfied smile as they closed with him, imagined the litany of smug congratulations he would be reciting to himself at the sight of their success and their reconciliation.

She frowned abruptly, giving Chaim a light shove. "Keep away from me, Dartagnan. I hope I never see you again, after this!"

He gaped at her. She winked, and the amazement fell away; he smiled feebly, nodded. "The same goes for me, you bitch! If I ever see Abdhialmal again, I'm going to shove his teeth down his throat."

"You'll have to wait in line." Vicious satisfaction—"Abdhialmal!"—and mock surprise.

Abdhialmal looked from face to face between them, shaking his head, his own face sour. "Well... I only have one question for you, then."

They stopped, finding murder on their faces. "What is it?"

"Are you going to ask me to witness when you marry?"

They looked at him in silent incredulity, and at each other. Slowly Chaim worked the gold ring off his gloved finger, and pressed it into Abdhialmal's open hand. Smiling, they passed him by on either side, and moved on across the field hand in hand.

—G—

#### TOO CLOSE TO HOME

[Continued from page 43]

as if his exoskin were empty. He had bitten the inside of his cheek and his mouth tasted like copper. No point in following him up on the monitor, no point to anything.

Then he reached over and switched to the next camera, followed Johnson as he went on toward the fusion plant. Might as well keep an eye on him.

A light flashed on the communications panel. Chou and his boys, now that it was too late.

"George—"

For a moment he couldn't believe. "Marina! Where are you?"

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"Out here—among all sorts of struts and cables—"

"But you didn't have a helmet!"

"The suit in the access lock did."

"I thought you'd decided to die with dignity."

Her laugh almost overpowered the suit phone. "Dignity! I'll go scratching and screeching—"

"Well, you just stay out there till Chou comes—"

"I can't—"

"Why not?"

"I didn't have time to get the life pack—the air in this suit's bad already. Where's Johnson?"

"In toward the fusion plant."

"Then I have to talk fast—"

"He's about a hundred meters away," said George, "coming fast."

Marina waved to show she'd heard, then looked away, listening. She'd taken off her spacesuit and was holding it in front of her where she floated against the bulkhead beside the door.

The screen swam in his vision and he could hear his heartbeat. All he had to do was stay conscious one more minute. He triggered a second dose of hexamine into his system; mighty near the line, but let the doctors worry about that if they ever got the chance.

He watched Johnson approach the bulkhead on one monitor, and as he came through on the other, Marina pushed the spacesuit away from her toward the camera and George shouted through the speaker. Johnson jackknifed and fired the flechette gun, slamming against the wall from the recoil.

And then Marina was all over him, and George was yelling and cheering in spite of his weakness.

She had Johnson's wrist bent the wrong way to immobilize him while she flowed up his back. Then she locked her legs around his waist and put the naked choke on him, pushing his head forward with her left hand while she ground her right forearm into his neck. He kicked and stretched his back, but Marina tightened her scissors grip and choked harder.

When he was safely unconscious, she tied his thumbs together with the line from the spacesuit for a beginning, and then tied his wrists together. When George blacked out she was starting on Johnson's feet.

George was awake when Chou and his men arrived. "About time you got here," and then Marina bent over his hand and snipped off the fanned end of the flechette with her pliers. "Jesus K. Christ," he said as she pulled the rest through point first.

Marina looked up from where she was kneeling on the deck. "George needs an anti-tetanus booster right now."

"I had one for breakfast."

"You need a booster."

"Yes, boss."

"Where's Johnson?" asked Chou.

She pointed at the monitor screen. "There. Just keep going till you find him."

"You did that?"

"I had to. Otherwise, George and I couldn't get married."

For once George's changeling visage failed as a mask. "Get married?"

"What do you think I was saying just before I went out the lock. Besides, it'll give me an excuse to stay around and tell those ninnies on the Council what I think of L-5 security."

—G—







Larry Niven

Allen Stevens

# THE RINGWORLD ENGINEERS

Larry Niven

## Part IV

### Synopsis

#### The Story Thus Far

The Ringworld is off-center. Most of the attitude jets on the rim wall are missing; the City Builder culture used them as motors on their interstellar spacecraft. Now, with the stabilizing system 5% operational, the Ringworld will still grind against its sun in two years.

Kzinti and human, they make poor slaves. The **Hindmost** kidnapped **Chmee** and **Louis Wu**, intending that they should rob the Ringworld spaceports for him. Things rapidly got out of hand. Now Chmee has deserted, taking the landing craft with him.

And Louis? Louis intends to save the Ringworld or die trying. He found a way to gain the puppeteer's cooperation. Louis has burned out **Needle's** hyperdrive motor.

Now they're all doomed—unless the Pak protectors who built the Ringworld had an alternative system for attitude control.

It seems they did. A grid of superconductor cable webs the **scrith** floor of the Ringworld. Could it be used to manipulate the Ringworld's relation to the sun, magnetically?

**Harkabee** and **Kawareskenjajok**—City Builder species from the floating city—have helped to interpret Louis's stolen library tapes. Some evidence points to the Great Ocean

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as the site of the Ringworld's Repair and Maintenance Center—if it exists.

The Great Ocean is too huge to search: a third of a trillion miles in area, sprinkled with islands which turn out to be maps of known and unknown worlds drawn on one-to-one scale. But Chmeee has been on the Map of Kzin for some days. He may have learned something. In any case, he must be rescued.

*Needle* is cruising beneath the Great Ocean, and Louis is half asleep, when the Hindmost makes a startling announcement.

### BENEATH THE WATERS (Continued)

**L**OUIS SHOOK HIS HEAD VIOLENTLY. *Wake up!* "What?"

"Mars is a cold, dry, nearly airless world, isn't it? The entire Map should be cooled, and desiccated too, somehow, and raised nearly above the atmosphere."

"Yah. All of that."

"Then look up. We should be beneath the Map of Mars. Do you see a fin far larger than that beneath the Map of Kzin? Do you see a nearly circular cavity bulging twenty miles inward?"

The was nothing above their heads but the inverted contours of a seabottom.

"Louis, this is disturbing. If our computer memory is failing us..." The Hindmost's legs folded. His heads dipped downward, inward.

"The computer memory is fine," Louis said. "Relax. The computer's fine. See if the ocean temperature is higher above us."

The Hindmost hesitated, half into foetal position. Then, "Aye, aye." The puppeteer busied himself at the controls.

Harkabeeparolyn asked, "Do I understand you? One of your worlds is missing?"

"One of the smaller ones. Sheer carelessness, my dear."

"These aren't balls," she said thoughtfully.

"No. Peeled like a round fruit, the peel spread flat."

The Hindmost called, "The temperatures in this vicinity vary. Ignoring the regions around fins, I find temperatures from forty to eighty degrees Fahrenheit."

"The water should be warmer around the Map of Mars."

"The Map of Mars is not in evidence, and the water is not warmer."

"What...at? But that's weird."

"If I understand you...yes, there is a problem." The puppeteer's necks arched out and curved around until he was looking into his own eyes. Louis had seen Nessus do that, and wondered if it was puppeteer laughter. It could be concentration. It was making Harkabeeparolyn queasy, but she couldn't seem to look away.

Louis paced. Mars *had* to be refrigerated. Then where...?

The puppeteer whistled an odd harmonic. "The grid?"

Louis stopped in midstride. "The grid. Right. And that would mean...futz! That easy?"

"We make progress of sorts. Our next move?"

They'd learned a good deal, looking at undersides of worlds. So—"Take us on to the Map of Earth, basement level, please."

"Aye, aye," said the Hindmost. *Needle* continued to spinward.

So much ocean, Louis thought. So little land. Why had the Ringworld Engineers wanted so much salt sea in two single bodies? Two for balance, of course, but why so large?

Reservoirs? Partly. Preserves for the sea life of an abandoned Pak world? A conservationist would call that praiseworthy; but these were Pak protectors. Whatever they did was done for the safety of themselves and their blood descendants.

The Maps, Louis thought, were a superb peice of misdirection.

Despite the contoured ocean floor, Earth was easy to recognize. Louis pointed out the flat curves of the continental shelves as they passed beneath Africa, Australia, the

Americas, Greenland—fins under Antarctica and the Arctic Ocean. The Ringworlders watched and nodded politely. Why would they care? It wasn't *their* home.

Yah, he'd do his best to get Harkabeeparolyn and Kawareskenjak home, if there was nothing else he could do for them. Louis Wu was as close to Earth now as he would ever be.

More seabottom passed above them.

Then shoreline: a flat curve of continental shelf bordering a maze of gulfs and bays and river deltas and peninsulas and island clusters and raggedy detail too fine for the human eye. *Needle* ran on to port of spinward. They passed beneath hollow mountain ranges and flat seas. A finely ruled line ran straight to spinward, and at its near end, a glint of light—

Fist-of-God.

Something huge had struck the Ringworld long ago. The fireball had pushed the Ringworld floor upward into the shape of a tilted cone, then ripped through. Pointing almost away from that great funnel-shape was the track of a much later meteorite: a crippled General Products spacecraft, with its passengers frozen in stasis, had touched down at a horizontal seven hundred and seventy miles per second. Futz, they'd actually bent the *scrith*!

*Hot Needle of Inquiry* rose into a spotlight beam: raw sunlight flooding vertically through the crater in Fist-of-God Mountain. Shards of *scrith*, stretched thin when that old fireball broke through, stood like minor peaks around a volcano cone. The ship lifted above them.

Desert sloped down and away. The impact that made Fist-of-God had cremated all life over a region comfortably larger than the Earth. Far, far away, a hundred thousand miles away, the blue of distance became the blue of sea; and only *Needle's* thousand-mile height let them see that far.

"Get us moving," Louis said. "Then give us a view from the lander's cameras. Let's see how Chmeee's doing."

"Aye, aye."

### THE GREAT OCEAN

**S**IX RECTANGULAR WINDOWS floated beyond the hull. Six cameras showed the lander's flight deck, lower deck, and four outside views.

The flight deck was empty. Louis scanned for emergency lights and found none.

The autodoc was still a great coffin, closed.

Something was wrong with the outside cameras. The view wavered and shifted and streamed with glowing colors. Louis was able to make out the courtyard, the arrow slits, several kintzi standing guard in leather armor. Other kintzi sprinted to and fro on all fours: blurred streaks.

Flames! The defenders had built a bonfire around the lander!

"Hindmost? Can you lift the lander from here? You said you had remote controls—"

"I could take off," the Hindmost said, "but it would be dangerous. We are...twelve minutes of arc to spinward and a bit to port of the Map of Kzin—a third of a million miles. Would you expect me to fly the lander with a lightspeed delay of three and a half seconds? The life support system is holding well."

Four kintzi streaked across the courtyard to throw open massive gates. A wheeled vehicle pulled in and stopped. It was larger than the Machine People vehicle that had brought Louis to the floating city. Projectile weapons were mounted on its four fenders. Kintzi emerged and stood studying the lander.

Had the castle's lord called on a neighbor for help? Or had a neighbor come to claim rights to an impregnable flying fort?

The vehicle's guns swivelled to face the cameras, and spat. Flame bloomed; the cameras shuttered. The great orange cats ducked, then rose to study the results.

No emergency lights showed on the flight deck.

"These savages haven't the means to harm the lander," the

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Hindmost said.

Explosive projectiles sprayed the lander again.

"I'll just take your word for it," Louis said. "Continue monitoring. Are we close enough so that I can get to the lander by stepping disks?"

The puppeteer looked himself in the eyes. He held the pose for several seconds.

Then he spoke. "We are two hundred thousand miles to spinward of the Map of Kzin, and a hundred and twenty thousand miles to port. The portward distance is irrelevant. The spinward distance would be lethal. It gives *Needle* and the lander a relative velocity of eight tenths of a mile per second."

"Too much?"

"Our technology is not miraculous, Louis! Stepping disks can absorb kinetic energies of up to two hundred feet per second, no more."

The explosions had scattered the bonfire. Armored kintzi guards were building it up again.

Louis bit down on a bad word. "All right. The fastest way to get me there is to run us straight to antispinward until I can use the stepping disks. Then we can take our time running to starboard."

"Aye, aye. What speed?"

Louis opened his mouth, and left it open while he thought. "Now, that is one fascinating question," he said. "What does the Ringworld meteor defense consider a meteor? Or an invading spacecraft?"

The puppeteer reached behind him, chewed at the controls. "I've cut our acceleration. We should discuss this. Louis, I don't understand how the City Builders knew it was safe to build a rim transport system. They were right, but how did they know?"

Louis shook his head. He could see why the Ringworld protectors might program the meteor defense not to fire on the rim walls. A safe corridor for their own ships—or maybe the computer was firing on the attitude jets whenever the attitude jets fired a high-velocity plume of gas. "I'd say the City Builders started with small ships and built up. They tried it and it worked."

"Stupid. Dangerous."

"We already know they did things like that."

"You have my opinion. At your orders, Louis: what speed?"

The high desert sloped gradually down: a baked and lifeless land, an ecology shattered and heated to incandescence thousands of *falans* ago. What had struck that blow from underneath the Ringworld? A comet wouldn't normally be that big. There were no asteroids, no planets; they had been cleaned out of the system during the building of the Ringworld.

*Needle's* velocity was already respectable. The land ahead was beginning to turn green. There were silver threads of river. "On the first expedition we flew at Mach 2, using flycycles," Louis said. "That'd take us... eight days before I can use the stepping disks. Too tanj long. I'm assuming the meteor defense fires on things that move fast relative to the surface. How fast is fast?"

"The easy way to find out is to accelerate until something happens."

"I do not believe I heard a Pierson's puppeteer say that."

"Have faith in puppeteer engineering, Louis. The stasis field will function. No weapon can harm us in stasis. At worst we will return to normal status after we strike the surface, and proceed henceforth at a lower speed. There are hierarchies of risk, Louis. The most dangerous thing we can do during the next two years is hide."

"I don't... if it was *Chmee* saying... but a Pierson's... give me a minute." Louis closed his eyes and tried to think. Then, "See how this sounds. First we loft the ruined probe, the one we left in the Library—"

"I moved it."

"Where?"

"To the nearest high mountain with an exposed *scrith* crest."

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The safest place I could think of. The probe is still valuable, though it can no longer manufacture fuel."

"That's a good place. Don't try to fly it. Just turn on every sensor on the probe, and every sensor aboard *Needle* and the lander. Turn most of them in the direction of the shadow squares. Now, where else would you put a meteor defense? Bear in mind that it can't seem to fire at anything *under* the Ringworld floor."

"I have no ideas."

"Okay. We aim cameras all over the Arch. Cameras on the shadow squares. Cameras on the sun. Cameras on the Map of Kzin and the Map of Mars."

"Definitely."

"We stay at a thousand miles altitude. Shall we dismount the probe in the cargo hold? Set it to following us?"

"Our only source of fuel? No."

"Then start accelerating until something happens. How does it sound?"

"Aye, aye," said the Hindmost, and he turned to the controls. And Louis, who would have welcomed more discussion, more time to nerve himself up, kept his silence.

The cameras caught it, but none of *Needle's* passengers did. Even if they'd been looking up, they wouldn't have caught it. They would have seen glare-white stars and the checkered blue Arch glowing against black space, and a black circle at the peak of the Arch, where *Needle's* flare shielding blocked out the naked sun.

But they weren't even looking up.

Below the ruin of the hyperdrive motor, the land was green with life. Jungle and swamp and wild land prevailed, with an occasional ragged crazy-quilt of cultivated farmland. Of the Ringworld hominids they'd seen so far, not many would make farmers.

There were covies of boats on flat seas. Once they crossed a spiderweb of roads half an hour wide: seven thousand miles wide. The telescope showed steeds carrying riders or pulling small carts. No powered vehicles. A City Builder culture must have fallen here, and stayed down.

"I feel like a goddess," Harkabeeparolyn said. "Nobody else could have such a view."

"I knew a goddess," Louis said. "At least she thought she was. She was a City Builder, too. She was part of a spacecraft crew; she probably saw what you're seeing now."

"Ah."

"Don't let it go to your head."

Fist-of-God Mountain shrank slowly. The Earth's Moon could have nestled in that vast shell. One had to see the mountain over such a distance, standing behind a landscape vaster than the habitable surfaces of all the worlds of known space, to appreciate its size. Louis wasn't feeling godlike. He felt tiny. Vulnerable.

The autodoc lid aboard the lander hadn't moved. Louis asked, "Hindmost, could Chmee have had other wounds?"

The puppeteer was out of sight somewhere, but his voice came clear. "Of course."

"He could be dying in there."

"No, Louis, I'm busy. Don't bother me!"

The telescope view had become a blur. The bright land a thousand miles below was visibly moving now; *Needle's* velocity had passed five miles per second. Orbital speed for Earth.

Cloud decks shone bright enough to hurt the eyes. Far aft, a checkerboard pattern of cultivation was thinning out. Directly below, the land dipped, then leveled off into hundreds of miles of flat grassland. The flatlands extended to right and left as far as the eye could see. Rivers that fed into the flats became swamps, suddenly green.

You could trace a ragged line of contoured bays, inlets, islands, peninsulas: the mark of Ringworld shoreline, designed for the convenience of boats and shipping. But that was the

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spinward border. Then several hundred miles of flat salt-poisoned land. Then the blue line of ocean. Louis felt the hair stir on his neck at this fresh memento of the Fist-of-God impact. Even this far away, the shoreline of the Great Ocean had been lifted; the sea had receded seven or eight hundred miles.

Louis rubbed dazzled eyes. It was too bright down there. Violet highlights—

Then blackness.

Louis closed his eyes tight. When he opened them it was as if he had left them closed: black as the inside of a stomach.

Harkabeparolyn screamed. Kawaresksenjajok thrashed. His arm struck Louis's shoulder, and the boy gripped Louis's arm with both hands and hung on. The woman's scream cut off abruptly. The she said, in a voice with teeth in it, "Luweewu, where are we?"

Louis said, "I take a wild guess and say we're at the bottom of the ocean."

"You are correct," said the Hindmost's contralto. "I have a good view by deep-radar. Shall I turn on a spotlight?"

"Sure."

The water was murky. *Needle* wasn't as deep as it might have been. There were fish nosing about; there was even a seaweed forest anchored nearby.

The boy released Louis and pressed his nose to the wall. Harkabeparolyn stared too; but she was shivering. She asked, "Luweewu, can you tell me what happened? Can you make it make sense?"

"We'll find out," said Louis. "Hindmost, take us up. Back to a thousand miles altitude."

"Aye, aye."

"How long were we in stasis?"

"I cannot tell. *Needle*'s chronometer stopped, of course. I will signal the probe to send data, but the lightspeed delay is sixteen minutes."

"How fast were we moving?"

"Five point eight one miles per second."

"Then take us up to five even and hold us there while we see what we've got."

The signals from the lander resumed as *Needle* approached the surface. Fire still surrounded the lander. The autodoc was still closed. Chmeece should have emerged by now, Louis thought.

Blue light grew around them. *Needle* broke free of the ocean and surged upward into sunlight. The deck barely quivered as the ocean dropped away at twenty gravities of acceleration.

The view aft was instructive.

Forty or fifty miles behind them, huge combers rolled across the flat beach that had been an undersea continental shelf. A grooved line ran straight back from the shore. *Needle* had not struck water. The fireball had struck land, and kept going.

Farther back, the beach became grassland. Farther yet, forest. It was all burning. Thousands of square miles of firestorm, flame streaming inward from all sides, pouring straight upward in the center, like the steam rushing in over a sunflower patch far, far away. *Needle*'s impact could not have caused all of that.

"Now we know," The Hindmost said. "The meteor defense is programmed to fire on inhabited territory. Louis, I am awed. The power expended compares to nothing less than the project that set the Fleet of Worlds in motion. Yet the automatics must do this repeatedly."

"We know the Pak thought big. How was it done?"

"Don't bother me for a while. I'll let you know." The Hindmost disappeared.

It was annoying. The puppeteer had all the instruments. He could lie his heads off, and how would Louis know? At this point the puppeteer couldn't even change the arrangement—

Harkabeparolyn was tugging at his arm. He snapped,

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"What?"

"Louis, I don't ask this lightly. My sanity flinches. Forces batter me, and I can't even describe them. Please, what has happened to us?"

Louis sighed. "I'd have to tell you about stasis fields and the Ringworld meteor defense. Also about Pierson's puppeteers and General Products hulls and Pak."

"I am ready."

And he talked, and she nodded and asked questions, and he talked. He couldn't be certain how much she understood, and of course he himself knew a lot less than he wanted to. Mostly he was telling her that Louis Wu knew what he was talking about. And when she was sure of that, she became calmer, which was what he was after.

Presently she took him to the water bed—ignoring the presence of Kawareksenjakok, who grinned at them over his shoulder, once, then went back to watching the Great Ocean move past.

In *rishathra* there was reassurance. Spurious, perhaps. Who cared?

There sure was a lot of water down there.

From a thousand miles up, one could see a long way before the blanket of air blocked the view. And for most of that distance, there wasn't a single island! The contours of seabottom showed, and some of that was shallow enough. But the only islands were far behind, and those had probably been underwater peaks before Fists-of-God distorted the land.

There were storms. One looked in vain for the spiral patterns that meant hurricane and typhoon. But there were cloud patterns that looked like rivers in the air. Watch them and they moved—from this height, they moved.

The kzinti who dared that vastness had not been cowards; and those who returned had not been fools. That pattern of islands on the starboard horizon—you had to squint to be sure it

was really there—that must be the Map of Earth. And it was lost in all that blue.

A cool, precise contralto voice eased into his thoughts. "Louis? I have reduced our maximum velocity to four miles per second."

"Okay." Four, five, who cared?

"Louis, where did you say the meteor defense was located?"

Something in the puppeteer's tone—"I didn't say. I don't know."

"The shadow squares, you said. You're on record. It must be the shadow squares if the meteor defense can't guard the Ringworld's underside." No overtones, no emotion showing in that voice.

"Do I gather I was wrong?"

"Now pay attention, Louis. As we passed four point four miles per second, the sun flared. I have it on visual record. We didn't see it because of the flare shielding. The sun extruded a jet of plasma some millions of miles long. It is difficult to observe because it came straight at us. It did not arch over in the sun's magnetic field, as flares commonly do."

"That was no solar flare that hit us."

"The flare stretched out several million miles over a period of twenty minutes. Then it lased in violet."

"Oh my God."

"A gas laser on a very large scale. The earth still glows where the beam fell. I estimate that it covered a region ten kilometers across: not an especially tight beam, but it would not normally need to be. With even moderate efficiency, a flare that large would power a gas laser beam at three times ten to the twenty-seventh ergs per second, for on the order of an hour."

Silence.

"Louis?"

"Give me a minute. Hindmost, that is one impressive weapon." It hit him, then: the secret of the Ringworld

Engineers. "That's why they felt safe. That's why they could build a Ringworld. They could hold off any kind of invasion. They had a laser weapon bigger than worlds, bigger than the Earth-Moon system, bigger than... Hindmost? I think I'm going to faint."

"Louis, we don't have time for that."

"What caused it? Something caused the sun to jet plasma. Magnetic, it has to be magnetic. Could it be one function of the shadow squares?"

"I wouldn't think so. Cameras record that the shadow square ring moved aside to allow the beam to pass, and constricted elsewhere, presumably to protect the land from increased insolation. We cannot assume that this same shadow square ring was manipulating the photosphere magnetically. An intelligent engineer would design two separate systems."

"You're right. Absolutely right. Check it anyway, will you? We've recorded all possible magnetic effects from three different angles. Find out what made the sun flare." Allah, Kdapt, Brahma, Finagle, let it be the shadow squares! "Hindmost? Whatever you find, don't curl up on me."

There was a peculiar pause. Then, "Under the circumstances, that would doom us all. I would not do that unless there was no hope left. What are you thinking?"

"There is never no hope left. Remember."

The Map of Mars was in view at last. It was farther away than the Map of Earth—a hundred thousand miles straight to starboard—but, unlike the Map of Earth, it was one compact mass. From this angle it showed as a black line: twenty miles above the sea, as the Hindmost had predicted.

A red light blinked on the lander's instrument board. Temperature: a hundred and ten Fahrenheit, just right for a spa. No lights blinked on the big coffin that held Chmeece. The autodoc had its own temperature controls.

The kzinti defenders seemed to have run out of explosives. Their supply of firewood seemed infinite.

Twenty thousand miles to go, at four miles per second.

"Louis?"

Louis eased himself out of the sleeping field. The Hindmost, he thought, looked awful. Mane rumbled, the garnets rubbed off along one side. He staggered, as if his knees were made of wood.

"We'll think of something else," Louis told him. He was wishing he could reach through the wall, stroke the puppeteer's mane, give reassurance of some kind. "Maybe there's some kind of library in that castle. Maybe Chmeece already knows something we don't. Tanj, maybe the repair crew already knows the answer."

"We know the same answer. A chance to study sunspots from underneath." The puppeteer's voice was wintry-cool, the voice of a computer. "You guessed, didn't you? Hexagonal patterns of superconductor embedded in the Ringworld floor. The *scrith* can be used to manipulate plasma jets in the solar photosphere."

"Yah."

"It may have been just such an event that pushed the Ringworld off center. A plasma jet formed to fire on a meteoroid, a stray comet, even a fleet from Earth or Kzin. The plasma impacted the Ringworld. There were no attitude jets to push it back into place. Without the plasma jet, the meteor itself might have been sufficient. The repair crew came later: too late."

"Let's hope not."

"The grid is not a backup for the attitude jets."

"No. Are you all right?"

"No."

"What are you going to do?"

"I will follow orders."

"Good."

"If I were still Hindmost to this expedition, I would give up now."

"I believe you."

"Have you guessed the worst of it? I compute that the sun can probably be moved. The sun can be made to jet plasma, and the plasma can be made to act as a gas laser, forming a photon drive for the sun itself. The Ringworld would be pulled along by the sun's gravity. But even the maximum thrust would be miniscule, too little to help us. At anything over two times ten to the minus fourth gravities of acceleration, the Ringworld would be left behind. In any case, radiation from the plasma jet would ruin the ecology. Louis, are you laughing?"

Louis was. "I never thought of moving the sun. I never would have. You actually went ahead and worked out the math?"

Wintry-cool and mechanical, that voice. "I did. It can't help us. What is left?"

"Follow orders. Hold us at four miles per second antispinward. Let me know when I can flick across to the lander."

"Aye, aye." The puppeteer turned away.

"Hindmost?"

A head turned back.

"Sometimes there's no point in giving up."

## THE MAP OF KZIN

**A**LL THE LIGHTS GLOWED GREEN. Whatever the medical situation, the autodoc was handling it somehow. Chmeece was alive in there—alive, if not healthy. But the flight deck thermometer indicated a temperature of 160° Fahrenheit.

The Hindmost said, "Louis, are you ready to cross?"

The Map of Mars was a black dash below the line of hologram "windows", straight to starboard. The Map of Kzin was a good deal harder to see. Ahead of Mars by several degrees of arc, and fifty thousand miles farther away, Louis made out blue-gray dashed lines against a blue-gray sea.

He said, "We're not exactly opposite yet."

"No. The Ringworld's spin will still impose a velocity difference between *Needle* and the lander. But the vector is vertical. We can compensate for long enough."

It took Louis a moment to translate those words into a diagram. Then, "You're going to dive at the ocean from a thousand miles altitude."

"Yes. No risk is insane now, given the position your insanity has put us in."

Louis burst out laughing (a puppeteer teaching courage to Louis Wu?) and sobered as suddenly. How else could an ex-Hindmost regain any of his authority? He said, "Good enough. Start your dive."

He dialed and donned a pair of wooden clogs. He stripped off his falling jumper and rolled it around the impact suit and utility vest, but kept the flashlight-laser in his hand. The empty seascape had begun to expand.

"Ready."

"Go."

Louis crossed a hundred and twenty thousand miles in one giant step.

## Kzin, twenty years ago:

Louis Wu sprawled on a worn stone *fooch* and thought well of himself.

Those oddly shaped stone couches called *foochesth* were as ubiquitous as park benches throughout the hunting parks of Kzin. They were almost kidney-shaped, built for a male kzin to lie half curled up. The kzin hunting parks were half wild and stocked with both predators and meat animals: orange-and-yellow jungle, with the *foochesth* as the only touch of civilization. With a population in the hundreds of millions, the planet was crowded by kzin standards. The parks were crowded, too.

Louis was then touring the jungle since morning. He was tired. Legs dangling, he watched the populace pass before him.

## THE RINGWORLD ENGINEERS

Within the jungle the orange kzinti were almost invisible. One moment, nothing. The next, a quarter ton of sentient carnivore hot on the trail of something fast and frightened. The male kzin would jerk to a stop, and stare—at Louis's closed-lip smile (because a kzin shows his teeth in challenge) and at the sign of the Patriarch's protection in his shoulder (Louis had made sure it showed prominently). The kzin would decide it was none of his business, and leave.

Strange, how that much predator could show only as a sense of presence in the frilly yellow foliage. Watching eyes and playful murder, somewhere. Then a huge adult male and a furry, cuddly adolescent half his height were watching the intruder.

Louis had a tyro's grasp of the Hero's Tongue. He understood when the kzin-kitten looked up at its parent and asked, "Is it good to eat?"

The adult's eyes met Louis's eyes. Louis let his smile widen to show the teeth.

The adult said, "No."

In the confidence of four Man-Kzin Wars plus some "incidents"—all centuries in the past, but all won by men—Louis grinned and nodded. *You tell him, Daddy! It's safer to eat kzin arsenic than human meat!*

Ringworld, twenty years later:

The walls bathed him in heat. He started to sweat. It didn't bother him. He'd used saunas. One hundred and sixty degrees isn't hot for a sauna.

The Hindmost's recorded voice snarled and spat in the Hero's Tongue, offering sanctuary on the Fleet of Worlds. "Cut that broadcast!" Louis commanded, and it was done.

Upward-streaming flames screened the windows. The cannon-carrying vehicle had been moved away. A pair of distorted kzinti sprinted across the courtyard, placed a cannister under the lander, sprinted back to a doorway.

These were not quite kzinti: not as civilized as Chmee. If they got their paws on Louis Wu—but he should be safe enough here.

Louis squinted down through the flames. There were six of the cannisters in place around the lander's base. Bombs, no doubt. They'd be set off any second now, before the flame could explode them individually.

Louis grinned. His hands poised above the control board while he fought temptation. Then: he tapped in instructions, fast. The buttons were uncomfortably hot. He braced his legs and gripped the chair back, with his falling jumper to pad his hands.

The lander rose from the flames. A ring of fireballs billowed below; and then the castle was a dwindling toy. Louis was still grinning. He felt virtuous; he'd resisted temptation. If he'd taken off on the fusion drive instead of the repulsors, the kzin would have been amazed at the power of their explosives.

Hail clattered on the hull and windows. Louis looked up, startled, as a dozen winged toys curved down toward him. Then the aircraft were dropping away. Louis pursed his lips; he reset the autopilot to halt his rise at five miles. Maybe he'd want to lose those planes. Maybe not.

He got up and turned for the stairs.

Louis snorted when he read the dials. He called the Hindmost. "Chmee is fully healed and peacefully asleep in the doc. The doc won't wake him up and let him out because conditions outside are not habitable."

"Not habitable?"

"It's too hot. The autodoc isn't set to let the patient step out into a fire. Things ought to cool off now that we're out of the flames." Louis ran his hand across his forehead; water streamed to his elbow. "If Chmee gets out, will you tell him the situation? I need a cold shower."

He was in the shower when the floor dropped under him.

Louis snatched for a towel and was wrapping it around his waist as he ran up the stairs. He heard hail rapping on the hull.

Chmee turned from his place at the controls, slowly and carefully, as if he still hurt. He squinted oddly. Hair had been shaved away around the eye. Mock skin covered a shaved strip running up his thigh to the groin. He said, "Hello, Louis. I see you survived."

"Yah. What are you doing?"

"I left pregnant females in the fortress."

"Are they about to be killed this instant? Or can we hover for a few minutes?"

"Have we something to discuss? I trust you know better than to interfere."

"The way things stand now, your females will be dead in two years."

"They may ride home in stasis aboard *Hot Needle of Inquiry*. I still hope to persuade the Hindmost—"

"Persuade me. I have taken command of *Needle*."

Chmee's hands moved. The floor surged savagely. Louis grabbed at a chair back and rode it out. A glance at the board told him that *Needle's* descent had stopped. The rain of projectiles had stopped too, though a dozen aircraft still circled beyond the windows. The fortress was half a mile below.

Chmee asked, "How did you arrange that?"

"I made slag out of the hyperdrive motor."

The kzin moved incredibly fast. Before Louis could do more than flinch, he was wrapped in orange fur. The kzin was pulling Louis against his chest with one arm, while the other held four claws against Louis's eyebrows.

"Shrewd," said Louis. "Very shrewd. Where do your plans carry you from here?"

The kzin didn't move. Blood trickled past Louis's eyes. He felt that his back was breaking. He said, "It seems I've had to rescue you again."

The kzin released him and stepped back, carefully, as if afraid to move on impulse. He asked, "Have you doomed us all? Or do you have some notion of moving the entire Ringworld back into position?"

"The latter."

"How?"

"A couple of hours ago I could have told you. Now we'll have to find another answer."

"Why did you do it?"

"I wanted to save the Ringworld. There was just one way to get the Hindmost's cooperation. His life's at stake now. How do I go about getting your cooperation?"

"You fool. I fully intend to learn how to move the Ringworld, if only to save my children. Your problem is to persuade me that I need you."

"The Pak who built the Ringworld were my ancestors. We're trying to think like them, aren't we? What did they build in that would do the job? Aside from that, I've got two City Builder librarians with a good knowledge of Ringworld history. They wouldn't cooperate with you. They already see you as monstrous, and you haven't even killed me yet."

Chmee thought it over. "If they fear me, they will obey. Their world is at stake. Their ancestors were Pak, too."

The lander's temperature had become uncomfortably cool for a naked man; but Louis was sweating again. "I've already located the Repair Center."

"Where?"

Louis considered withholding that information, briefly. "The Map of Mars."

Chmee sat down. "Now, that is most impressive. These displaced kzinti learned a good deal about the Map of Mars during their age of exploration, but they never learned that."

"I'll bet some ships disappeared around the Map of Mars."

"The aircraft pilot told me that many ships disappeared, and nothing of value was ever taken from the Map of Mars. The explorers brought home wealth from a Map further to spinward, but they never brought as much wealth as they put

into making the ships. Do you need the autodoc?"

Louis wiped blood from his face with his falling jumper. "Not just yet. That Map to spinward sounds like Earth. So it wasn't defensed after all."

"It seems not. But there is a Map to port, and ships that went there never returned. Could the Repair Center be there?"

"No, that's the Map of Down. They met Grogs." Louis swabbed at his face again. The claws hadn't cut deep, he thought; but a facial cut bleeds a long time. "Let's do something about your pregnant females. How many?"

"I don't know. Six were in their mating period."

"Well, we don't have room for them. They'll have to stay in the castle. Unless you think the local lord will kill them?"

"No, but he may very well kill my male children. Another danger. . . well, I can deal with that." Chmee turned to the controls. "The most powerful civilization is built around one of the old exploration ships, the *Behemoth*. If they track me here, there might be war against the fortress."

The aircraft burned like torches as they fell. Chmee tested the sky with radar, deep-radar, and infrared. Empty. "Louis, were there more? Did any land?"

"I don't think so. If they did, they ran out of fuel, and there aren't any runways . . . roads? Scan the roads. You can't let them radio the big ship." Radio would be line-of-sight, and the Ringworld atmosphere probably had a Heavyside layer.

There was one road, and tanj few straight patches on it. There were flat fields. It was some minutes before Chmee was satisfied. The aircraft were dead, all of them.

"Next step," said Louis. "You can't just wipe out everyone in the fortress. I gather kzinti females can't take care of themselves."

"No. . . Louis, it's odd. The females of the castle are much more intelligent than those of the Patriarchy."

"As intelligent as you?"

"No! But they even have a small vocabulary."

"Is it possible that your own people have been breeding your females for docility? Refusing to mate with the intelligent ones, for hundreds of thousands of years? After all, you cull the slave species."

Chmee shifted restlessly. "It may be. The males here are different, too. I tried to deal with the rulers of the exploration ship. I showed my power, then waited for them to attempt to negotiate. They attempted no such thing. They behaved as if there was nothing to do but fight until they or I were destroyed. I had to mock Chjarri, to insult his pride in his ancestry, before he would tell me anything."

But puppeteers never bred these kzinti for docility, Louis thought. "Well, if you can't take the females out of the fortress and you can't kill off the males, then you'll tanj well have to deal with them. God Gambit?"

"Perhaps. Let us do it this way. . ."

Well above arrow range, just above the range of the cannon on the intruder's vehicle, the lander hovered. Its shadow covered the ashes of the fire in the courtyard. Louis listened to the voices from Chmee's translator, and waited for Chmee's signal.

Chmee inviting archers to fire at him. Chmee threatening, promising, threatening. Staccato thunder from a laser beam cutting rock, followed by a crash. Hissing, snarling, spitting.

No mention of Chmee's really dangerous master.

Four hours he was down there. Then Chmee stepped from one of the narrow windows and floated upward. Louis waited till he was aboard, then lifted.

Presently Chmee appeared behind him, minus flying belt and impact armor. Louis said, "You never signalled for the God Gambit."

"Are you offended?"

"No, of course not."

"It would have gone badly. And . . . I could not have done it. This is my own species. I could not threaten them with a man."

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"Okay."

"Kathakt will raise my children as heroes. He will teach them arms, and arm them well, and when they are old enough he will turn them loose to conquer their own lands. They will be no threat to his own domains, you see, and they will stand a good chance to survive if I do not return. I left Kathakt my flashlight-laser."

"Good enough."

"I hope so."

"Are we through with the Map of Kzin?"

Chmee pondered. "I captured an aircraft pilot. They are all nobility, with names and comprehensive educations. Chjarri told me much about the age of exploration, after I mocked the accomplishments of his ancestors. We may assume that there is an extensive historical library within the *Behemoth*. Shall we capture it?"

"Tell me what Chjarri told you. How far did they get on Mars?"

"They found a wall of falling water. Later generations invented pressure suits and high-altitude aircraft. They explored the edges of the Map, and one team reached the center, where there was ice."

"I think we'll just skip the *Behemoth*'s library, then. They never got inside. Hindmost, are you there?"

A microphone said, "Yes, Louis."

"We're heading for the Map of Mars. You do the same, but stay to port of us in case we have to flick across."

"Aye, aye." Have you anything to report?"

"Chmee picked up some information. Kzinti explored the surface of the Mars Map, and they didn't find anything un-Marslike. So we still don't know where to look for an opening."

"Perhaps from beneath."

"Yah, could be. That'd be annoying. How are our guests holding out?"

"You should rejoin them soon."

"Soon as I can, then. You see if there's data on Mars in Needle's computer. And on martians. Louis out." He turned.

"Chmee, do you want to fly this thing? Don't exceed four miles per second."

The lander surged up and forward in obedience to the kzinti's touch. A gray wall of cloud broke to let them through; then there was only blue sky, darkening as they rose. The Map of Kzin streamed below them. Then behind them.

Chmee said, "The puppeteer seems docile enough."

"Yah."

"You seem very sure of the Map of Mars."

"Yah," Louis grinned. "It's a very nice piece of misdirection, but it couldn't be perfect, could it? They had too much to hide, by volume. We went under the Great Ocean on the way here. Guess what we found when we went under the Map of Mars?"

"Don't play games."

"Nothing. Nothing but seabottom. Not even radiator fins. Most of the other Maps have radiator fins to cool the poles. Passive cooling systems. There has to be a system to cool the Map of Mars. Where's the heat going? I thought it might be going into the seawater, but it wasn't. We think the heat is pumped directly into the superconductor grid in the Ringworld floor."

"Superconductor grid?"

"Big mesh, but it controls magnetic effects in the Ringworld foundation. That controls effects in the sun. If the Map of Mars plugs into the grid, it has to be the Ringworld Control Center."

Chmee thought it over. He said, "They could not pump heat into the seawater. The warm, wet air would rise. Cloud patterns would stream inward and outward from great distances. From space the Map of Mars would appear as a great target. Can you imagine Pak protectors making such a mistake?"

"No." Though Louis would have.

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"I remember too little about Mars. The planet was never very important to your people, was it? It was no more than a source of legends. I do know that the Map is twenty miles high, to mimic the very rarified air of the planet."

"Twenty miles high, and fifty-six million square miles in area. That's one billion, one hundred and twenty million cubic miles of hiding place."

"Urrr," said Chmeee. "You must be right. The Map of Mars is the Repair Center, and the Pak did their best to hide it. Chjarri told me of the monsters and the storms and the distances of the Great Ocean. They would have made good passive guardians. A fleet of invaders might never have guessed the secret."

Louis rubbed absently at four itching spots across his eyebrows. "One point twelve times ten to the ninth cubic miles. I have to admit it, that number leaves me numb. What were they *keeping* in there? Patches big enough to plug Fist-of-God Mountain? Machinery big enough to carry those patches, and plant them, and weld them tight? That winching equipment we saw on the rim wall, for the attitude jets? Spare attitude jets? Tanj, I'd love to find spare attitude jets. But they'd *still* have room to spare."

"War fleets."

"Yah. We already know about their *big* weapon, but... war fleets, of course, and ships to carry refugees, too. Maybe the whole Map is one big refugee ship. It must have been big enough to evacuate the Ringworld, before the population started filling every niche in the ecology."

"A spacecraft? Perhaps a spacecraft big enough to tow the Ringworld back into place? I have trouble thinking on this scale, Louis."

"Me, too. I don't think it'd be big enough."

"Then what did you have in mind, when you destroyed our hyperdrive motor?" Suddenly the kzin was snarling.

Louis chose not to flinch. "I thought the Ringworld might be set up to act on the sun magnetically. I was almost right. The trouble—"

The Hindmost's voice blared from a speaker. "Louis! Chmeee! Set the lander on autopilot and flick across to me, now!"

#### THE MAP OF MARS

**C**HMEEE REACHED THE DISK ahead of Louis, in one monstrous bound. The kzin could take orders too, Louis thought. He forebore to remark on the fact.

The City Builders were looking out through the hull, not at the passing seascape—which was nothing but blue sea and cloud-striped blue sky merging at the infinity-horizon—but at a movie-screen-sized hologram. As Chmeee appeared on the receiver disk they turned, and flinched, and tried to hide it.

Louis said, "Chmeee, meet Harkabeeparolyn and Kawaresksenjakok, librarians from the floating city. They've been of great help in gaining us information."

The kzin said, "Good. Hindmost, what is the problem?"

Louis tugged at the kzin's fur and pointed.

"Yes," said the puppeteer. "The sun."

The sun showed dimmed and magnified in the hologram rectangle. A brilliant patch near the center was shifting, twisting, changing shape as they watched.

Chmeee said, "Wasn't the sun doing that shortly before we boarded the spaceport ledge?"

"Right. You're looking at the Ringworld meteor defense. Hindmost, what do we do now? We can slow down, but I don't see any way to save the lander."

"My first thought was to save your valuable selves," the puppeteer said.

The sea threw back a highlight from directly below the fleeing *Needle*. Now it seemed to be growing brighter, with a violet tinge. Suddenly, momentarily, it was unbearably bright.

Larry Niven



Cortney Skinner

Then it was a black spot on the hull beneath their feet.

And a thread of jet black, outlined in violet-white, stood upon the spinward horizon. A vertical pillar, reaching from ground to sky. Above the atmosphere it was invisible.

The kzin spoke words in the Hero's Tongue.

"All very well," said the Hindmost in Interworld. "But what is it firing on? I assumed we were the target."

Louis asked, "Isn't the Map of Earth in that direction?"

"Yes. Also a good deal of water and considerable Ringworld landscape."

Where the beam touched down, the horizon glowed white. Chmee whispered in the Hero's Tongue; but Louis caught the sense. "With such a weapon I could boil the Earth to vapor."

"Shut up."

"It was a natural thought, Louis."

"Yah."

The beam cut off abruptly. Then it touched down again, a few degrees to port.

"Tanj dammit! All right, Hindmost, take us up. Take us high enough to use the telescope."

There was a glowing yellow-white point on the Map of Earth. It had the look of a major asteroid strike.

There was a similar glow farther away, at the far shore of the Great Ocean.

The solar flare had dimmed and was losing coherence.

Chmee asked, "Were there aircraft or spacecraft in those directions? Fast-moving objects?"

"The instruments may have recorded something," the Hindmost said.

"Find out. And take us down to one mile altitude. I think we want to approach the Map of Mars from below the surface."

"Louis?"

"Do it."

Chmee asked, "Have you knowledge of how that laser beam was produced?"

"Louis can tell you," the puppeteer said. "I will be busy."

*Needle* and the lander converged on the Map of Mars from two directions. The Hindmost held the two vehicles parallel, so that it was possible to cross between them.

Louis and Chmee flicked across to the lander for lunch. Chmee was hungry. He consumed several pounds of red meat, a salmon, a gallon of water. Louis's own appetite suffered. He was pleased that his guests weren't watching.

"I don't understand why you picked up these passengers," Chmee said, "unless it was to mate with the woman. But why the boy?"

"They're City Builders," Louis said. "Their species ruled most of the Ringworld. And I plucked these two out of a library. Get to know them, Chmee. Ask them questions."

"They fear me."

"You're a soft-spoken diplomat, remember? I'm going to invite the boy to see the lander. Tell him stories. Tell him about Kzin, and hunting parks, and the House of the Patriarch's Past. Tell him how kzinti mate."

Louis flicked across to *Needle*, spoke to Kawaresksenjajok, and was back in the lander with him before Harkabeeparolyn quite realized what was happening.

Chmee showed him how to fly. The lander swooped and did somersaults and darted skyward at his command. The boy was entranced. Chmee showed him the magic of binocular goggles, and superconductor cloth, and impact armor.

The boy asked about kzinti mating practices.

Chmee had mated with a female who could talk! It had opened new vistas for him. He told Kawaresksenjajok what he wanted to know—which Louis thought was pretty dull stuff—then got the boy talking about mating and *rishathra*.

Kawaresksenjajok had no practice but a lot of theory. "We make records if a species will let us. We have archives of tapes. Some species have things they can do instead of *rishathra*; or

they may like to watch, or to talk about it. Some mate in only one position, others only in season, and this carries over. All of this influences trade relationships. There are aids of various kinds. Did Luweewu tell you about vampire perfume?"

They hardly noticed when Louis left to return to *Needle* alone.

Harkabeeparolyn was upset. "Luweewu, he might hurt Kawa!"

"They're doing fine," Louis told her. "Chmee's my crewmate, and he likes children of all species. He's perfectly safe. If you want to be his friend, too, scratch him behind the ears."

"How did you hurt your forehead?"

"I was careless. Look, I know how to calm you down."

They made love—well, *rishathra*—on the water bed, with the massage unit going. The woman might have hated Panth Building, but she had learned a good deal. Two hours later, when Louis was sure he would never move again, Harkabeeparolyn stroked his cheek and said, "My time of mating should end tomorrow. Then you may recover."

"I have mixed feelings about that," he chuckled.

"Luweewu, I would feel better if you would rejoin Chmee and Kawa."

"Okay. Behold as I stagger to my feet. See me at the stepping disk? There I go: poof, gone."

"Luweewu—"

"Oh, all right."

The Map of Mars was a dark line, growing, becoming a wall across their path. As Chmee slowed, microphones on the lander's hull picked up a steady whispering, louder than the wind of their passage.

They came to a wall of falling water.

From a mile distant it appeared perfectly straight and infinitely long. The top of the waterfall was twenty miles above their heads. The base was hidden in fog. Water thundered in their ears, until Chmee had to turn off the microphones; and then they could hear it through the hull.

"It's like the water condensers in the city," the boy said.

"This must be where my people learned how to make water condensers. Chmee, did I tell you about water condensers?"

"Yes. If the City Builders came this far, one wonders if they found the way inside. Do your tales tell anything of a hollow land?"

"No."

Louis said, "Their magicians are all built like Pak protectors."

The boy asked, "Luweewu, this great waterfall... why is there so much of it?"

"It must run all the way round the top of the Map. It takes out the water vapor. The top of the Map has to be kept dry," Louis said. "Hindmost, are you listening?"

"Yes. Your orders?"

"We'll circle with the lander, using deep-radar and the other instruments. Maybe we'll find a door under the waterfall. We'll use *Needle* to explore the top. How's our fuel supply?"

"Adequate, given that we won't be going home."

"Good. We'll dismount the probe and set it following *Needle* at... ten miles and ground-hugging altitude, I think. Keep the stepping-disk links and the microphones open. Chmee, do you want to fly the lander?"

The kzin said, "Aye, aye."

"Okay. Come one, Kawa."

"I'd like to stay here," the boy said.

"Harkabeeparolyn would kill me. Come on."

*Needle* rose twenty miles, and red Mars stretched before them.

Kawaresksenjajok said, "It looks awful."

Louis ignored that. "At least we know we're looking for something big. Picture a blowout patch big enough to plug

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Fist-of-God Mountain. We want a hatch big enough for that patch plus the vehicle to lift it. Where would you put it on the Map of Mars? Hindmost?"

"Under the waterfall," the Hindmost said. "Who would see? The ocean is empty. The falling water would hide all."

"Yah. Makes sense. But Chmee's searching that. Where else?"

"I must hide the lines of a gigantic hatch in a martian landscape? Perhaps an irregular shape, with hinges in a long, straight canyon. Perhaps I would put it beneath the ice, melting and refreezing the north pole to conceal my comings and goings."

"Is there a canyon like that?"

"Yes. I did my homework. Louis, the poles are the best gamble. Martians never went near the poles. Water killed them."

The Map was a polar projection; the south pole was spread out around the rim. "Okay. Take us to the north pole. If we don't find anything, we'll spiral out from there. Stay high and keep all instruments going. We don't care too much if something fires on *Needle*. Chmee, are you listening?"

"I hear."

"Tell us everything. Chances are you'll find what we're after. Don't try to do anything about it." Would he obey? "We don't invade in the lander. We're burglars. We'd rather be shot at in a General Products hull."

Deep-radar stopped at the *scrith* floor. Above the *scrith* the mountains and valleys showed translucent. There were seas of marsdust fine enough to flow like oil. Under the dust were cities of a sort: stone buildings, denser than the dust, with curved walls and rounded corners and a good many openings. The City Builders stared, and so did Louis Wu. Martians had been extinct in human space for hundreds of years.

The air was clear as vacuum. Off to starboard, well beyond the horizon, was a mountain taller than any on Earth. Mons Olympus, of course. And a splinter of white floated above the crater.

*Needle* fell, and pulled out of the fall just above the crescent dunes. The structure was still visible, floating fifty to sixty yards above the peak; and *Needle* must have been quite visible to its occupants.

"Chmee?"

"Listening."

Louis fought a tendency to whisper. "We've found a floating skyscraper. Maybe thirty stories tall, with bay windows and a landing ledge for cars. Built like a double cone. It looks very much like the building we took over on our first trip, the good ship *Improbable*."

"Identical?"

"Not quite, but close. And it's floating above the highest mountain on Mars, just like a god-tanjed signpost."

"It does sound like a signal meant for us. Shall I flick through?"

"Not yet. Have you found anything?"

"I believe I've traced the lines of a tremendous hatch inside the waterfall. It would pass a war fleet, or a patch to cover the crater in Fist-of-God. There may be signals to open it. I haven't tried."

"Don't. Stand by. Hindmost?"

"I have radiation and deep-radar scans. The building is radiating little energy. Magnetic levitation does not require large amounts of power."

"What's inside?"

"Here—" The Hindmost gave them a view. By deep-radar the structure showed translucent gray. It appeared to be a floating building modified for travel, with fuel tanks and an air-breathing motor built into the fifteenth floor. The puppeteer said, "Solid construction: walls of concrete or something equally dense. No vehicles in the carport. Those are telescopes or other sensor devices in the tower and the basement. I cannot

tell if the structure is occupied."

"That's the problem, all right. I want to outline a strategy. You tell me how it sounds. One: we go to just above the peak, as fast as possible."

"Making perfect targets of ourselves."

"We're targets now."

"Not from weapons inside Mons Olympus."

"What the futz, we're wearing a General Products hull. If nothing fires on us we go to step two: we deep-radar the crater. If we find anything but a solid *scrith* floor we go to step three: vaporize that building. Can we do that? Fast?"

"Yes. We don't have power storage to do it twice. What is step four?"

"Anything to get us inside quick. Chmee stands by to rescue us any way he can. Now tell me whether you're going to freeze up halfway through this procedure."

"I wouldn't dare."

"Wait a bit." It came to Louis that their native guests were scared spittleless. To Harkabeeparolyn he said, "If there is a place in the world where the world can be saved, that place is below us. We think we've found the door. Someone else has found it, too. We don't know anything about him, or them. Understand?"

The woman said, "I'm frightened."

"So am I. Can you keep the boy calm?"

"Can you keep me calm?" She laughed, raggedly. "I'll try."

"Hindmost. Go."

*Needle* leapt into the sky at twenty gravities, and rolled, and stopped upside down, almost alongside the floating building. Louis's belly rolled too. Both City Builders shrieked. Kawareskenjajok had a death-grip on his arm.

Eyesight showed the crater plugged by old lava. Louis watched the deep-radar image.

It was there! A hole in the *scrith*, an inverted funnel leading up (down!) through the crater in Mons Olympus. It was far too small to pass Ringworld repair equipment. This was a mere escape hatch; but it was roomy enough for *Needle*.

"Fire," Louis said.

The Hindmost had last used this beam as a spotlight. At close range it was devastating. The floating building became a streamer of incandescence with a comet-like head of boiling concrete. Then it was only dust-cloud.

Louis said, "Dive."

"Louis?"

"We're a target here. We don't have time. Dive. Twenty gravities. We'll make our own door."

The ochre landscape was a roof over their heads. Deep-radar showed a hole in the *scrith*, dropping to engulf them. But every other sense showed the solid lava crater in Mons Olympus descending at terrible speed to smash them.

Kawareskenjajok's nails in Louis's arm were drawing blood. Harkabeeparolyn seemed frozen. Louis braced for the impact.

Darkness.

There was formless, milky light from the deep-radar screen. Something else was glowing somewhere: green and red and orange stars. Those were dials on the flight deck.

"Hindmost!"

No answer.

"Hindmost, give us some light! Use the spotlight! Let us see what's threatening us!"

"What happened?" Harkabeeparolyn asked plaintively. Louis's eyes were adjusting; he could see her sitting on the floor, hugging her knees.

Cabin lights came on. The Hindmost turned from the controls. He looked shrunken: half curled up already. "I can't do this any more, Louis."

"We can't use the controls. You know that. Give us a spotlight so we can see out."

The puppeteer touched controls. A white diffused light bathed the hull in front of the flight deck.

"We are embedded in something." One head glanced down;

the other said. "Lava. The outer hull is at seven hundred degrees. Lava was poured over us while we were in stasis and is now cooled."

"Sounds like someone was ready for us. Are we still upside down?"

"Yes."

"Then we can't accelerate up. Just down."

"Yes."

"Want to try it?"

"What are you asking? I want to start over from just before you burned out the hyperdrive motor—"

"Come on, now."

"—Or from just before I decided to kidnap a man and a kzin. That was probably a mistake."

"We're wasting time."

"There is no place to radiate *Needle's* excess heat. Using the thrusters would bring us an hour or two closer to the moment when we must go into stasis and await developments."

"Hold off for a while, then. What are you getting from deep-radar?"

"Igneous rock in all directions, cracked with cooling. Let me expand the field. . . . Louis? *Scritch* floor some six miles below us, below *Needle's* roof. A much thinner *scrith* ceiling fourteen miles above."

Louis was beginning to panic. "Chmee, are you getting all this?"

He was answered in unexpected fashion.

He heard a howl of inhuman pain and rage as Chmee burst from the stepping-disk, running full out with his arms across his eyes. Harkabeeparolyn dove out of his path. The water bed caught the kzin across the knees and he rolled across the bed and onto the floor.

Louis had leapt for the shower. He flipped it on full blast, jumped the water bed, put his shoulder into Chmee's armpit and heaved. Chmee's flesh was hot beneath the fur.

The kzin stood and followed the pull, into the stream of cold water. He moved about, getting water over every part of himself; then huddled with his face in the stream. Presently he said, "How did you know?"

"You'll smell it in a minute," Louis said. "Scorched fur. What happened?"

"Suddenly I was burning. A dozen red lights glowed on the board. I leapt for the stepping-disk. The lander is still on autopilot, if it isn't destroyed."

"We may have to find out. *Needle's* embedded in lava. Hindmost?" Louis turned toward the flight deck.

The puppeteer was curled up with his heads beneath his belly.

One shock too many. It was easy to see why. A screen on the flight deck showed a half-familiar face.

The same face, enlarged, was looking out of the rectangle that had been a deep-radar projection. A mask of a face, like a human face molded out of old leather; but not quite. It was hairless. The jaws were hard, toothless crescents. From deep under a ridge of brow, the eyes looked speculatively out at Louis Wu.

## WHEELS WITHIN WHEELS



"IT APPEARS YOU'VE LOST YOUR PILOT," the leathery-faced intruder told him. It floated outside the hull: the distorted head and melon-sized shoulders of a protector, a ghost within the black rock that enclosed them.

Louis could only nod. The shocks had come too fast, from the wrong directions. He was aware that Chmee stood beside him, dripping water, silently studying a potential enemy. The City Builders were mute. If Louis read their faces right, they were closer to awe or rapture than fear.

The protector said, "That traps you thoroughly. Soon enough you must go into stasis, and we need not discuss what happens

after that. I am relieved. I wonder if I could make myself kill you."

Louis said, "We thought you were all dead."

"The Pak died off a quarter of a million years ago." The protector's fused lips and gums distorted some of the consonants; but it was speaking Interworld. Why Interworld?

"A disease took them. You were right to assume that the protectors were all dead. But *tree-of-life* is alive and well beneath the Map of Mars. Sometimes it is discovered. I speculate that the immortality drug was made here, when a protector needed funding for some project."

"How did you learn Interworld?"

"I grew up with it. Louis, don't you know me?"

It was like a knife in the gut. "Teela. How?"

Her face was hard as a mask. How could it show expression? She said, "A little knowledge. You know the adage? Seeker was looking for the base of the Arch. I paraded my superior education before him: I told him that the Arch had no base, that the world was a ring. He became badly upset. I told him that if he was looking for the place from which the world could be ruled, he should look for the construction shack."

"Repair center," said Louis. A glance toward the flight deck showed the Hindmost as an elongated white footstool decorated in ruby and lavender gems.

"Of course it would become the repair center, and the center of power, too," the protector said. "Seeker remembered tales of the Great Ocean. It seemed a likely choice, protected by the natural barriers of distance, storm, and a dozen predatory ecologies. Astronomers had studied the Great Ocean from vantages far along the Arch, and Seeker remembered enough to make us maps."

"We were sixteen years crossing the Great Ocean. There should be legends made from that voyage. Did you know that the Maps are stocked? The kzinti have colonized the Map of Earth. We could not have continued if we had not captured a kzin colony ship. There are islands in the Great Ocean that are large life forms, their backs covered in vegetation, that dive when a sailor least expects it—"

"Teela! How? How could you get to be like this?"

"A little knowledge, Louis. I never did reason out the origin of the Ringworld Engineers, not until too late."

"But you were lucky!"

The protector nodded. "Bred for luck, by Pierson's puppeteers meddling with Earth's Fertility Laws to make the Birthright Lotteries. You assumed it worked. It always seemed stupid to me. Louis, do you want to believe that six generations of Birthright Lottery winners produced a lucky human being?"

He didn't answer.

"Only one?" She seemed to be laughing at him. "Consider the luck of all the descendants of all the winners of the Birthright Lotteries. In twenty thousand years they must be well on their way out of the galaxy, fleeing the explosion of the galactic core. Why not aboard the Ringworld? Three million times the habitable surface area of the Earth, and it can be moved. Louis. The Ringworld is lucky for those unborn descendants of people bred for luck. If I can save the Ringworld, then it is luck for them that we came here twenty-three years ago, and luck for them that Seeker and I found the entrance in Mons Olympus. Their luck. Never mine."

"Did it happen to him, too?"

"Seeker died, of course. We both went mad with the hunger for *tree-of-life* root, but Seeker was a thousand years too old. It killed him."

"I should never have left you," Louis said.

"I gave you no choice. I had none myself, if you believe in luck. I have little choice now. Instincts are very strong in a protector."

"Do you believe in luck?"

She said, "No. I wish I could."

Louis flapped his arms—a gesture of helplessness—and

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turned away. He had always known that he would meet Teela Brown again. But not like this! He waved the sleeping field on and floated.

The Hindmost had the right idea. Crawl into your own navel. But humans can't bury their ears. Louis floated half curled up, with his arms over his face. But he heard:

"Speaker-to-Animals, I congratulate you on regaining your youth."

"My name is Chmeece."

"I beg your pardon," the protector said. "Chmeece, how did you come here?"

The kzin said, "I am thrice trapped. Kidnapped by the Hindmost, barred by Louis from escaping the Ringworld, trapped underground by Teela Brown. This is a habit I must break. Will you fight me, Teela?"

"Not unless you can reach me, Chmeece."

The kzin turned away.

"What do you want from us?" That was Kawareskenjak, speaking diffidently in the City Builder tongue, echoed in interworld by the translator.

"Nothing," Teela, in City Builder.

"Then... what are we doing here?"

"Nothing. I've seen to it that you can do nothing."

"I don't understand." The boy was near tears. "Why do you want to bury us underground?"

"Child, I do what I must. I must prevent one point five times ten to the twelfth murders."

Louis opened his eyes.

Harkabeeparolyn objected, heatedly. "But we're here to prevent deaths! Don't you know that the world is off center, sliding into the sun?"

"I know of that. I formed the team that has been remounting the Ringworld's attitude jets, reversing the damage done by your species."

"Luweewu says that it isn't enough."

"It isn't."

They had Louis Wu's complete attention now.

The librarian shook her head. "I don't understand."

"With the attitude jets in action we extend the lifespan of the Ringworld by as much as a year. An extra year for three times ten to the thirteenth intelligent beings is equivalent to giving everyone on Earth an extra thousand years of lifespan. A worthy accomplishment. My collaborators agreed, even those who are not protectors."

Louis could trace the lines of Teela Brown's face in the protector's leather mask. Bulges at the hinges of the jaw, a skull swollen to accommodate more brain tissue—but it was Teela, and it hurt terribly. *Why doesn't she go away?*

Habits die hard, and Louis had an analytic mind. He thought, *Why doesn't she go away? A dying protector in a doomed artificial world! She doesn't have a minute to spare talking to a collection of trapped breeders. What does she think she's doing?*

He turned to face her. "You formed the repair crew, did you? Who are they?"

"My appearance helped. Most hominids will at least listen to me. I gathered a team of several hundred thousand from various species. I brought three here to become protectors: from the Spill Mountain People and the Night People and the vampires. I hoped that they would see a solution hidden to me. Their viewpoints would differ. The vampire, for instance, was nonsentient before the change."

"They failed me," said Teela. *She certainly behaved as if she had time. Time to entertain trapped aliens and breeders until the Ringworld brushed the shadow squares!* "They saw no better solution. And so we mounted the remaining Bussard ramjets on the rim wall. We have now mounted all but the last. Under the direction of the remaining protector, my team will gear the remaining Ringworld spacecraft to carry them to safety around some nearby star. Some Ringworlders will survive."

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"We're back to the original question," Louis said. "Your crew is hard at work. What are you doing here?" *I'm right! She's trying to tell us something!*

"I came to prevent the murder of fifteen hundred thousand million intelligent hominids. I recognized the neutrino exhaust from thrusters built in human space, and I came to the only feasible scene of the crime. I waited. Here you are."

"Here we are," Louis agreed. "But you know tanj well that we didn't come to commit any murders whatever."

"You would have."

"Why?"

"I can't tell you that."

Yet she showed no inclination to end the conversation. It was a strange game Teela was playing. They would have to guess at the rules. Louis asked, "Suppose you could save the Ringworld by killing one and a half trillion inhabitants, out of thirty trillion. A protector would do that, wouldn't she? Five percent to save ninety-five percent. It seems so... efficient."

"Can you empathize with that many thinking beings, Louis? Or can you only imagine one death a time, with yourself in the starring role?"

He didn't answer.

"Thirty billion people inhabit human space. Picture all of them dead. Picture fifty times that population dying of, let us say, radiation poisoning. Do you sense their pain, their regrets, their thoughts for each other? From that many? The numbers are too large. Your brain won't handle it. But mine will."

"Oh."

"I can't make it happen. I can't let it happen. I knew I must stop you."

"Teela. Picture a shadow square sweeping down the width of the Ringworld at around seven hundred miles per second. Picture a thousand times the population of human space dying as the Ringworld disintegrates."

"I do."

Louis nodded. Pieces of a puzzle. Teela would give them as many pieces as she could. She couldn't make herself hand them a finished picture. So keep fishing for pieces. "Did you say remaining protector? There were four, and now there's one plus you? What happened to the others?"

"Two protectors left the repair crew at the same time I did. They must have left separately. Perhaps they found the clues that announced your arrival. I felt it necessary to track them down and stop them."

"Really? If they were protectors, they could no more kill a trillion and a half thinking hominids than you could."

"They might arrange for it to happen, somehow."

"Somehow." Careful with the wording, now. He was glad that nobody was trying to interrupt. Not even Chmeece, the soft-spoken diplomat. "Somehow, let breeders reach the only place on the Ringworld where the crime can be committed. Would that have been their strategy, if you hadn't stopped them?"

"Perhaps."

"Let these carefully chosen breeders be protected from smelling free-of-life, somehow." *Pressure suits! That was why Teela had been looking for an interstellar spacecraft.* "Let them become aware of the situation, somehow. And somehow a protector has to doublethink his way out of killing them before they see the solution and use it, killing astronomical numbers of breeders to save even more. Is that what you think you prevented?"

"Yes."

"And this is the right place?"

"Why else would I be waiting here?"

"There's one protector left. Will he come after you?"

"No. The Night People protector knows that she alone is left to supervise the evacuation. If she tries to kill me and I kill her, breeders alone might die en route."

"You do seem to kill very easily," Louis said bitterly.

"No. I can't kill five percent of the Ringworld populace; and I



don't know that I can kill you, Louis. You are a breeder of my species. On the Ringworld you are alone in that distinction."

"I thought of ways to save the Ringworld," said Louis Wu. "If you know of a large-scale transmutation device, we know how to use it."

"Certainly the Pak had none. That was not your cleverest deduction, Louis."

"If we could punch a hole under one of the Great Oceans, then control the outflow, we could use the reaction to put the Ringworld back in place."

"Clever. But you can't make the hole and you can't plug it. Furthermore, there is a solution that does less damage, yet it is too much damage, and I cannot permit it."

"How would you save the Ringworld?"

The protector said, "I can't."

"Where are we? What went on in this part of the Repair Center?"

A long moment passed. The protector said, "I may not tell you more than you know. I don't see how you can escape, but I must consider the possibility."

"I quit," said Louis Wu. "I concede. Tanj on your silly game."

"All right, Louis. At least you will never die."

Louis closed his eyes and curled up in free fall. *Pious bitch.*

"I will keep you company until you must go into stasis," Teela said. "I can do little else for your comfort. You, what are your names and where are you from? You are of the species that conquered the Ringworld and the stars."

Chattering. Why weren't people born with flaps over their ears? Was there a hominid with that trait?

Kawareskenjak asked, "What is a magician's position regarding *rishathra*?"

"That is important when you meet a new species, isn't it, child? My position is that *rishathra* is for breeders. But we do love."

The boy was enjoying himself immensely. His sense of wonder was stretched nowhere near its limits. Teela told of her great journey. Her band of explorers had been trapped by Grog on the Map of Down, then freed by the odd inhabitants. On Kzin there were hominid animals imported long ago from the Map of Earth, bred for special traits until they differed as thoroughly as dogs. Teela's crew had hidden among them. They had stolen a kzin colony ship. They had killed one of the krill-eating island-beasts for food, freezing the meat in an empty liquid hydrogen tank. It had fed them for months.

Finally he heard her say, "I must eat now, but I will return soon." And then there was quiet.

The few minutes of silence ended as blunt teeth closed gently on Louis's wrist. "Louis, wake. We have no time to indulge you."

Louis turned over; he killed the sleeping field. He took a moment to savor the interesting sight of a puppeteer standing next to a kzin in the prime of health. "I thought you were out of it."

"A valuable illusion that came too near reality. I was tempted to let events take their own course," said the puppeteer. "Teela Brown spoke the truth when she said we will not die. Most of the Ringworld will break up and fly free, beyond the cometary halo. We might even be found someday."

"I'm starting to feel the same way."

"The protectors must have been dead for a quarter of a million years. Who told me that?"

"If you had any sense you'd quit listening to me."

"Not quite yet, if you please. I have the impression the protector was trying to tell us something. Pak were your ancestors, and Teela is of your own culture. Advise us."

"She wants us to do her dirty work for her," Louis said. "It's doublethink all the way. Futz, you studied the interviews with Brennan after he turned protector. Protectors have very strong instincts and superhuman intelligence. There's bound to be

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conflict between the two."

"I don't grasp the nature of the dirty work."

"She knows how to save the Ringworld. They all did. Kill five percent, save ninety-five... but they can't do it themselves. They can't even let someone else do it, but they have to make someone else do it. Doublethink."

"Specifics?"

Something about those numbers ticked at Louis's hindbrain. Why?... Tanj on it. "Teela picked that building because it looked like Halloprillalar's floating jail, the one we commandeered on the first expedition. She picked it to get our attention. She left it where she wanted us. I don't know what this part of the Repair Center does, but it's the right spot, in a billion-cubic-mile box. We're supposed to figure out the rest."

"What then? Is she certain we're trapped?"

"Whatever we try, she'll try to stop us. We'll have to kill her. That's what she was telling us. We only have one advantage. She's fighting to lose."

"I don't follow you," said the puppeteer.

"She wants the Ringworld to live. She wants us to kill her. She told us as much as she could. But even if we figure it all out... can we kill that many intelligent beings?"

Chmee said, "I pity Teela."

"Yah."

"How can we kill her? If you are right, then she must have planned something for us."

"I doubt it. I'd guess she's done her best not to think of anything we can do. She'd have to block it. We're on our own. And she'll kill aliens by instinct. With me she might hesitate that crucial half-second."

"Very well," said the kzin. "The big weapons are all on the lander. We are embedded in rock. Is the stepping-disk link to the lander still open?"

The Hindmost returned to the flight deck to find out. He reported, "The link is open. The Map of Mars is *scrith*, but only centimeters thick. It does not have to stand the terrible stresses of the Ringworld floor. My instruments penetrate it, and so do the stepping disks. Our only good fortune to date."

"Good. Louis, will you join me?"

"Sure. What's the temperature aboard the lander?"

"Some of the sensors have burned out. I can't tell," said the Hindmost. "If the lander can be used, well and good. Otherwise gather your equipment and return in haste. If conditions are intolerable, return instantly. We need to know what we have to work with."

"The obvious next step," Chmee agreed. "What if the lander is inoperable?"

"We'd still have a way out," said Louis, "but we've got to have pressure suits. Hindmost, don't wait for us. Find out where we are, and find Teela. She'll be in an open space, something suitable for growing crops."

"Aye, aye. I expect we are some distance beneath Mons Olympus."

"Don't count on it. She could have put a heavy laser beam on us to keep *Needle* in stasis, then towed us to where she had million rock ready to pour. And that place will turn out to be the murder site."

"Louis, do you have any idea what she expects of us?"

"Barely an idea. Skip it for now." Louis dialled himself a couple of bath towels and passed one to Chmee. He added a set of wooden clogs. "Are we ready?"

Chmee bounded onto the stepping disk. Louis followed.

## THE REPAIR CENTER



IT WAS LIKE FLICKING INTO AN OVEN. Louis had his clogs, but the only thing protecting Chmee's feet was the carpeting. The kzin disappeared down the stairs, snarling once when he brushed metal.

Louis was holding his breath. He hoped Chmee was doing the same. It felt that hot: hot enough to sear the lungs. The

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floor was tilted four or five degrees. Looking out the window was a mistake: it froze him in disbelief. In the murky dark outside: a queuing sand shark? *Seawater?*

He'd lost two or three seconds. He took the stairs more carefully than Chmee had, fighting the need to breathe, snorting puffs of breath through his nose to clear the oven-hot air that worked its way in anyway. He smelled char, staleness, smoke, heat.

Chmee was nursing burnt hands; the fur puffed up hugely around his neck. The handles on the lockers were metal. Louis wrapped the towel around his hands and began opening lockers. Chmee used his own towel to heave out the contents. Pressure suits. Flying belts. Disintegrator. Superconductor cloth. Louis picked his pressure suit helmet out of that and turned on the air feed, wrapped his towel around his neck for padding and donned the helmet. The wind that blew around his face was merely warm. He pulled in sweet air, his chest heaving.

Chmee's suit didn't have a separate helmet; he had to put it on and seal it up. The rasp of his sudden panting was fearsome in Louis's earphones.

"We're underwater," Louis gasped. "Why is it so futzy hot?"

"Ask me later. Help me carry this." Chmee scooped up his flying belt and impact armor, a spool of black wire and a healthy share of the superconductor cloth, and the heavy two-handed disintegrator. He made for the stairs. Louis staggered after him, with Prill's flying belt and flashlight-laser and two pressure suits and sets of impact armor. The meat of him was beginning to broil.

Chmee stopped before the flight deck instruments. Bubbling dark green water showed through the windows. Small fish wove paths within an extensive seaweed forest. The kzin puffed, "There, the dials... record your answer. Teela poured heat at me in... a blast of microwaves. Life support failed. *Scrith* repulsors failed. The lander sank. Water stopped... the microwaves. Lander stayed hot because... heat pumps burned out first... insulation too good. We can't use the lander now."

"Futz that," Louis used the stepping disk.

He dropped what he was carrying. Sweat was streaming into his eyes and mouth. He pulled the hot helmet off and sucked cool air. Harkabeeparolyn had her shoulder under his armpit and was half-carrying him toward the bed, murmuring soothing City Builder words.

Chmee hadn't appeared.

Louis pulled himself loose. He dropped the helmet over his head and staggered back to the stepping disk.

Chmee was working the controls. He pushed his own gear into Louis's arms. "Take this. Join you momentarily."

"Aye, aye."

Louis was half into his pressure suit when the kzin reappeared in *Needle*. The kzin stripped off his own suit. "We are in no great hurry. Louis. Hindmost, the lander is useless. I set it to take off on fusion motors and fly to Mons Olympus, purely as a diversion. Teela may waste a few seconds destroying it."

The microphone answered. "Good. I can report some progress, but I may not show it to you. We know that Teela can tap my communications."

"Well?"

The Hindmost flicked in from the flight deck. Now he could speak without mechanical aids. "Most of my instruments are useless, of course. I do know our orientation. There is a source of neutrino emission, massive, probably a fusion plant, some two hundred miles to port of spinward. Deep-radar shows cavities all around us. Most are merely room-sized. Some are tremendous, and these hold heavy machinery. I believe I have identified the empty cavern which held the repair crew's scaffolding, from its size and shape and the cradles on the floor. Its exit is a massive curved door in the wall of the Map.

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hidden by the waterfall. I found storage for what must be patches for major meteor strikes, and another hatch. Small spacecraft, possible warcraft—I can't tell—and yet another hatch. There are six hatches in all beneath the waterfall. I managed to—"

"Hindmost, you were to find Teela Brown!"

"Did I hear you counsel Louis Wu to patience?"

"Louis Wu is human; he knows patience. You, you grazing beast, you have far too much."

"And you propose to murder the human variant of a Pak protector. I hope you are not expecting some kind of duel? Scream and leap, and Teela will fight barehanded? We must fight Teela with our minds. Patience, kzin. Remember the stakes."

"Proceed."

"I managed to locate the mapping of Mons Olympus, eight hundred miles to antispinward of port of us. I surmise that Teela kept a heavy laser firing on *Needle*, or some such similar artifact, to keep us in stasis while she towed us eight hundred miles. I cannot guess why."

Louis said, "She towed us to where she had molten rock ready to pour. That place will turn out to be the site of her hypothetical multiple murder. We still have to figure out how. Tanj, maybe she's overestimated our intelligence!"

"Speak for yourself, Louis. Likely it is below us." One puppeteer head arced upward. "Nearly above us, by ship's orientation, is a complex of rooms in which a good deal of electrical activity can be sensed, not to mention enough pulsed neutrino emission to indicate half a dozen deep-radar sets."

"I also found a hemisphere 38.8 miles in diameter, with another neutrino source partly up the wall. A moving source. Output is random, as with a fusion plant. It hasn't moved far during the few minutes you've been gone, but it might traverse the full 180° of dome in fifteen hours, plus-or-minus three. Meat-eater, warrior, does that suggest anything to you?"

"An artificial sun. Where?"

"Twenty-five hundred miles toward the starboard edge of the map. But since you will be invading through Mons Olympus, you must search twelve degrees to antispinward of starboard. There may be walls to penetrate. Did you bring the hand disintegrator?"

"Not being totally nonsentient, I did. Hindmost, if the lander should reach Mons Olympus, then we may exit through the stepping disks and straight out the lander's cargo door. But Teela will shoot it down first."

"Why should she? We are not aboard yet. She has deep-radar, she will know that."

"Uurr. Then she will track the lander, wait until we appear, and destroy us then. Is this the sapience that aids your people to sneak up on a leaf?"

"Yes. You will enter Mons Olympus hours before the lander arrives. I set the probe to follow us. There is a stepping-disk receiver in the probe. Of course, you will have no way to return to *Needle*."

"Uurr. It sounds workable."

"What equipment will you use?"

"Pressure suits, flying belts, flashlight-lasers, and the disintegrator. I also brought this." Chmee indicated the superconductor cloth. "Teela doesn't know of it. That may help us. We can sew it into garments to cover our pressure suits. You, Harkabeeparolyn, can you sew?"

"No."

Louis said, "I can."

"So can I," said the boy. "You have to show me what you want."

"I will. It need not be elegant. We must hope that Teela will use lasers rather than projectiles or a war-ax. Our impact armor will not fit over pressure suits."

"Not quite true," Louis said. "For instance, Chmee, your impact armor would fit over my pressure suit."

"Swaddled like that, you could not move fast enough."

"Maybe not. Harkabeeparolyn, how are you holding up?"

"I'm confused, Louis. Are you battling with or against the protector?"

"She's fighting us, but she's hoping to lose," Louis said gently. "She can't say so. The rules she plays by are built into her brain and glands. Can you believe any of that?"

Harkabeeparolyn hesitated. Then, "The protector acted like, like somebody it feared was supervising everything it said and did. It was like that in Panth Building when I was training."

"That's the way it is. The supervisor is Teela herself. Can you fight a protector, knowing that the whole world could die if you lose?"

"I think so. At worst I may distract the protector."

"Okay. We're taking you with us. We've got equipment that was meant for another City Builder woman. I'll teach you as much as I can about what you'll be wearing. Chmee, she'll have our impact suit between her pressure suit and the superconductor cloth."

"She may have Halloprillalar's flashlight-laser. I lost mine through carelessness. I will carry the disintegrator. Also I know how to rig spare batteries to release their power in a millisecond."

"These batteries are my people's. We designed them for safety," the Hindmost said dubiously.

"Let me see them anyway. Next you must close off all avenues of communication. We must expect Teela to eat and return before we finish here. I wish we had more time. Louis, show Kawareksenjak how to sew our covering garments. Use superconductor for thread."

"Yah, I thought of that. Tanj, I wish we had more time."

They bounced toward the stepping disks, swaddled in gear. Harkabeeparolyn was shapeless in layers of cloth. Her face within the helmet was tense with concentration. Pressure suit, flying belt, laser—she'd be lucky to remember how to work what she was wearing, let alone fight. From a distance it might be Louis Wu under all that cloth. Teela might hesitate. Anything might count.

She was gone. Louis followed, switching on his flying belt.

Chmee, Harkabeeparolyn, Louis Wu: they floated like balls of black tissue paper above the rust-colored slope of Mons Olympus. The probe wasn't floating. It must have hovered until it ran out of fuel, then dropped and rolled. It was badly battered. The stepping-disk had survived.

The dials below Louis's chin told him that the air was very thin, very dry, rich in carbon dioxide. A good imitation of Mars—but this was nearly Earth's gravity. How had the martians survived? They must have adapted, buoyed by the sea of dust they lived in. Stronger than their extinct cousins. *Stick to business!*

The crater rim was forty miles upslope. It took them fifteen minutes. Harkabeeparolyn trailed. Her flying was jerky; she must have been constantly fiddling with the controls.

The hatch at the bottom of the crater was rock-and-rust-colored, and rough-surfaced. It had exploded inward, downward.

They dropped into darkness.

Their flying belts held them. That shouldn't have worked. The repulsor units were repelling flat *scrith* plates overhead and underneath. But the *scrith* ceiling was not load-bearing. It was much thinner than the Ringworld floor below them.

Louis switched to infrared (hoping Harkabeeparolyn would remember. Otherwise she'd be blind). Heat radiated from below, a small bright circle. Their surroundings were vast, indistinct. Columns of disks, and slender ladders alongside, along three walls. And rising up the middle of the great room, a tilted tower of toroids. They fell past it, ring by ring. A linear accelerator, aimed up through Mons Olympus? Then those disks could be one-protector fighting platforms waiting to be launched into the sky.

A hole had been punched downward through the floor. They

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dropped through. Harkabeeparolyn was still with them. The warm spot was still below, growing large.

Twelve floors, close together, each with a hole punched through. *Needle* had cut quite a swath. Even the last of the ruptures was a big one—and infrared light glared through it. The chamber below was just short of red hot. Chmee dropped into it well ahead of Louis. A moment later he floated back up, then settled on the floor above.

They were maintaining radio silence. Louis imitated Chmee: he dropped through the last hole and found himself in a blaze of infrared. Enormous heat had been released here. And the tunnel leading away glowed more brightly still.

Louis rose to join Chmee. He waved at Harkabeeparolyn, and she settled beside him with a thump.

*Yah*. *Needle* had been towed away through that tunnel, with enough heat played on the ship to trigger the stasis field. Easy to follow—except that they'd broil. Now what?

Now follow Chmee, who was floating away at speed. What did he have in mind? If only they could talk!

They were moving through residential space. It was confining for people trying to fly at speed. Cubicles with no doors, or else doors like the doors on a safe; never a curtain for mere privacy. How did Pak protectors live? Glimpses into cubicles showed spartan simplicity. On the floor of a cubicle, a skeleton with swollen joints and a crested skull. One great room was full of what must have been exercise equipment, including a jungle-gym that looked a mile high.

They flew for hours. Sometimes there were miles of straight corridor. They could take these at high speed. At other times they had to pick their way.

Doors blocked them. Chmee dealt with that: the doors sprayed away from the disintegrator beam in a cloud of monatomic dust.

Dust puffed from one big door; and then the dust stopped coming and the door was still there. A blank rectangle. It must be *scrith*, Louis thought.

Chmee took them left, around whatever that door guarded. Louis dropped behind Harkabeeparolyn and flew backward, watching for Teela Brown to emerge. The big door remained closed. If it hid Teela Brown, she couldn't detect them through *scrith*. Even protectors had limits.

They could have been following the tunnel to *Needle*, moving above it; but they weren't. With *Needle*'s position to establish their orientation, Chmee was leading them about twelve degrees to antispinward of starboard, toward a great hemispherical cavity with a moving neutrino source halfway up one wall. Good enough.

They veered right when they could. They passed another *scrith* door, but it wasn't blocking their path. Whatever they had circled, it was big. An emergency control room? They might want to find it again.

Fourteen hours had passed, and almost a thousand miles, before they stopped to rest. They slept in a kind of waist-high metal doughnut centered in a vast expanse of floor. Purpose unknown; but nothing could sneak up on them. Louis was getting hungry for something besides nutrient syrup. He wondered: had Teela eaten, and gone about her business, and had time to grow hungry again?

They flew on. They were out of the residential section now, though there were still cubicles here and there, with empty food storage bins and plumbing and nice flat floors for catnaps. But these were tucked away in huge chambers that might hold anything or nothing.

They flew around the perimeter of a tremendous pump, judging from the racket that pounded their eardrums until they had left it behind. Chmee led them left, and blasted through a wall, and took them into a Map Room so large that Louis shrank within himself. When Chmee blasted the far wall the huge hologram blazed and died, and they moved on.

Close now. They slept on top of a fusion generator that

wasn't running. Four hours, then they moved on.

A corridor, and light beyond, and wind blowing them onward.

They emerged into the light.

The sun was just past zenith in a nearly cloudless sky. An endless sunlit landscape stretched before them: ponds, groves of trees, fields of grain, and rows of dark green vegetables. Louis felt like a target. A coil of black wire was taped to his shoulder. Now he pulled it free and flung it away. One end was still attached to his suit. It would radiate heat, if she fired now.

Where was Teela Brown?

Not here, it seemed.

Chmee led them across a range of small hills. He arced down beside a stagnant pond. Louis followed, with Harkabeeparolyn behind him. The kzin was opening his spacesuit. As Louis touched down, Chmee held both palms outward, then mimed holding his suit tightly shut.

*Don't open your suit*. He meant it for Harkabeeparolyn. She'd been warned, but Louis watched her till he was sure she wouldn't.

Now what?

The land was too flat. Hiding places looked scarce; groves of trees, a handful of soft-edged hills behind them—too obvious. Hide underwater? Maybe. Louis began reeling in the superconductor wire he'd thrown away. They probably had hours to prepare—but when Teela came, she'd come like lightning.

Chmee had stripped himself naked. Now he put the suit of superconductor cloth back on. He went to Harkabeeparolyn and helped her remove his own impact armor, and donned it. Leaving her that much more helpless. Louis did not interfere.

Hide behind the sun? The small, fusion-powered, neutrino-emitting sun—at least it was no obvious hiding place. Could it be done? With superconductor wire trailing into a pond, he'd only be at the boiling point of water. Tanj, that was clever! It would even have worked, nearer the martian surface, where water would boil at some reasonable temperature. But they were too near the Ringworld floor; air pressure was nearly at sea level.

They might wait for days. The wafer in the suits would hold out, and the sugar syrup, and Louis Wu's patience, probably. Chmee was already out of his suit. There might even be prey for him.

But what of Harkabeeparolyn? If she opened her suit she'd be sniffing *tree-of-life*.

Chmee had re-inflated his pressure suit. Now he pulled his flying belt over it. He set a rock on each toe, then fiddled with the flying belt until it was straining upward. Now, *that* was clever. Kick the rocks away and flip the thruster on, and an empty suit would fly to the attack.

Louis hadn't thought of anything comparable.

Maybe Teela only came here every couple of weeks. Maybe she stored *tree-of-life* roots elsewhere.

What did *tree-of-life* look like, anyway. These glossy clumps of dark green leaves? Louis pulled one up. There were fat roots underneath, vaguely like yams or sweet potatoes. He didn't recognize the plant; but he didn't recognize anything that lived here. Most of what lived on the Ringworld, and everything here, must have been imported from the galactic core.

Teela laughed in Louis's ear.

## PROJECTOR



LOUIS DIDN'T JUST JUMP; he screamed inside his helmet.

There was laughter in Teela's voice, and a slurring of consonants that she couldn't help; lips and gums fused into a hard beak. "I never want to fight a Pierson's puppeteer again! Chmee, do you think you're dangerous? That puppeteer almost got me."

Somehow she was activating their dead earphones. Could

she track them by the same means? Then they were dead. So assume she couldn't.

"There were no signals from your ship. Communications dead. I had to know what was happening inside. So I rigged something to hook into the stepping disks. I can tell you that wasn't easy. First I had to guess that a puppeteer might bring stepping disks from his home planet, then I had to deduce how they worked, and build it—and when I hooked in and flicked over, the puppeteer was reaching for the stasis field switch! I had to guess where the transmitter disk was, and tanj fast! But I got out, and your ship must be in stasis, and nobody's coming to help you. I'm coming for you now," said Teela, and Louis heard the regret in her voice.

Nothing to do but wait, now. The Hindmost was out of the picture, with all of the equipment aboard *Needle*. Nothing left but what was in their hands.

It sounded like she'd be a while, though, if she wasn't lying. Louis lifted on his flying belt.

A mile, two miles, and the roof was still far above. Ponds, streams, gentle hills: a thousand square miles of garden turned to wilderness. Lacy-leaved, bell-shaped trees formed a spreading jungle to port. Hundreds of square miles of yellow bushes to spinward and starboard still retained traces of the rows in which they'd been planted.

He found one big entrance to spinward, and at least three smaller ones, including the tunnel to antispinward, the one that had brought them here.

Louis dropped to near the surface. They'd have to defend from all four directions. If he could find some kind of bowl-shape—there, off-center, a stream with low hills around it. Why not the middle of a stream? He studied it from above, with the feeling that he was missing some crucial point.

Yah.

Louis streaked back to where Chmee had taken cover. He shook Chmee's arm and pointed.

Chmee nodded. He ran toward the corridor they'd entered by, towing his pressure suit like a balloon. Louis lifted via his flying belt and waved Harkabeeparolyn to follow.

A notched ridge of low hills, with a pond behind. Might make a nice ambush. Louis settled on the crest. He stretched out flat, where he could watch the entrance. He turned for a moment to hurl his coil of superconductor wire toward the pond, and watched to be sure it reached the water.

*There was only one way out of Needle. The only stepping disk Teela could have reached led to a probe on the slope of Mons Olympus. Teela's route was the route they'd followed, and it led here.*

Several swallows of sugar syrup; several swallows of water. Try to relax. Louis couldn't see Chmee, he hadn't any idea where the kzin had gone. Harkabeeparolyn was looking at him. Louis pointed at the corridor, then waved her away. She got it. She slid around the curve of a hill. Louis was alone.

These hills were too tanj flat. The thigh-high clumps of dark, glossy green leaves would hide a motionless man, but impede movement.

Time passed. Louis used the sanitary facilities in his suit, feeling helpless and hurried. Back to his post. *Stay ready. With her knowledge of the Repair Center's interior transport systems, she'd come fast. Hours from now, or now.*

Now! Teela came like a guided missile, just under the corridor's roof. Louis glimpsed her as he rolled to fire. She was standing upright on a disk six feet across, hanging onto an upright post with handles and controls on it.

Louis fired. Chmee fired from wherever he hid. Two threads of ruby light touched the same target. Teela was squatting by then, hidden by the disk. She'd seen all she wanted, placed their positions to the inch.

But the flying disk flared ruby flame, and it was falling. Louis had a last glimpse of Teela before she dropped behind the strange, lacy trees.

She had spread a tiny paraglider.

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*So assume she's alive and unhurt, and move away fast. Economically, Louis went over the crest of the hill and watched from the other side. It could work, and his tail of superconductor thread was still in the pond.*

Where was she?

Something leapt from the crest of the next hill over. Green light speared it in midair, and held while the thing flamed and died. So much for Chmee's spacesuit. But a flight of hand-sized missiles flew toward the base of the green laser beam. Half a dozen white flashes from behind the rise, and the *snap!* of lightning striking close, showed that Chmee had succeeded in turning puppeteer-made batteries into bombs.

Teela was close, and she was using a laser. And if she was circling the pond, just beyond the crest... Louis adjusted his position.

Chmee's burnt suit had fallen too slowly. A protector would know it was empty. Cthulhu and Allah! How could anyone fight a lucky protector?

Teela popped up, lower down the hillside than Louis had expected, speared Louis on a lance of green light and was gone before Louis's thumb could move. Louis blinked. The flare shielding in his helmet had saved his eyes. But, instincts or no, Teela was trying to kill Louis Wu.

She popped up again, elsewhere. Green light died on black cloth. This time Louis fired back. She was gone; he didn't know whether he'd hit her. He'd glimpsed pliant leather armor a little loose on her, and joints swollen hugely: knuckles and finger joints like walnuts, knees and elbows like cantaloupes. She wore no armor except her own skin.

Louis rolled sideways and down the hill. He started crawling, fast. Crawling was hard work. Where would she be next? He'd never played this game. In two hundred years of life, he'd never been a soldier.

Two puffs of steam drifted above the pond.

To his left, Harkabeeparolyn suddenly stood and fired. Where was Teela? Her laser didn't answer. Harkabeeparolyn stood like a black-robed target; then she ducked and ran down the hill. Flattened out and started to crawl, left and upward.

The rock came from her left, and how could Teela have been there that fast? It smacked Harkabeeparolyn's arm hard enough to smash bone, and to rip the sleeve open. The City Builder woman stood howling, and Louis waited to see her cut down. *Futzfutzfutz! but track the beam—*

No beam came. And he shouldn't be watching; he should be acting. He'd seen where the rock came from. There was a cleft between two hills, and he crawled as fast as he dared, to put hillside between himself and Teela. Then around...Tanj, where was Chmee now? Louis risked a glance over the crest.

Harkabeeparolyn had stopped screaming. She sniffed. She dropped her flying belt and tore the black cloth away, one-handed. Her other arm flapped loose, broken. She began trying to take off her suit.

Teela had been *there*. Where would she move? She was ignoring Harkabeeparolyn.

Harkabeeparolyn's helmet wouldn't come loose. She reeled down the hill, straining to rip the fabric one-handed, then smashing at the faceplate with a rock.

Too much time was passing. Teela could be anywhere by now. Louis moved again, to a notch carved by a brook now dry. If he tried a hilltop, she'd be watching it.

Could she actually guess his every move? Protector! Where was she now?

*Behind me?* Louis felt spiders on the back of his neck. He spun around, for no good reason, and fired at Teela as a small metal tool slashed along his ribs. The missile ripped his suit and flesh, and jarred his aim. He clasped his left arm across the torn fabric while playing the ruby beam where Teela had last been. Then she popped up and was gone before the beam could reach her, and a dense metal ball sprayed chips from his helmet.

He rolled downhill, holding his suit shut with his left arm.

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Through the starred helmet he saw Teela coming at him like a great black bat, and he held the ruby beam on her faster than she could dodge.

Tanj dammit, she wasn't dodging! And why should she? Harkabeeparolyn's suit of black superconductor cloth was now worn by Teela Brown. He held the beam on her with both hands. She'd get warmer than she liked before she killed him. The armored demon bounded toward him with black cloth shredding around her like wet tissue.

Shredding. Why? And what was that smell? She veered and threw the laser like a missile, sideways, at Chmee. Disintegrator and flashlight-laser spun away from Chmee's hand. They crashed together.

The smell of *tree-of-life* was in Louis's nose and in his brain. It was not like the wire. Current was sufficient unto itself, an experience that demanded nothing further to make it perfect. The smell of *tree-of-life* was ecstasy, but it sparked a raging hunger. Louis knew what *tree-of-life* was, now. It had glossy dark green leaves and roots like a sweet potato, and it was all around him, and the taste...something in his brain remembered the taste of Paradise.

It was all around him, and he couldn't eat. He couldn't eat. He couldn't eat because of his helmet, and he tore his hands away from the clamps that would release his helmet, because he couldn't eat while the human variant of a Pak protector was killing Chmee.

He steadied the laser with both hands, as if it might recoil. The kzin and the protector were inextricably tangled and rolling downhill, leaving shreds of black cloth. He followed them down with a thread of ruby light. *First fire. then aim. You're not really hungry. It would kill you, you're too old to make the change to protector. it would kill you.*

Tanj, the smell! His brain reeled with it. The strain of resisting it was horrible. It was every bit as bad as not resetting his droid every evening of his life for these past eighteen years. Intolerable! Louis held the beam steady and waited.

Teela missed a disemboweling kick. For an instant her leg stuck straight out. The red thread touched it, and Teela's shin flashed eye-searing red.

He saw another clear shot that disappeared as he fired. Part of Chmee's nude pink tail flared and fell away, writhing like an injured worm. Chmee didn't seem to notice. But Teela knew where the beam was. She tried to throw Chmee into it. Louis moved the wand of red light clear and waited.

Chmee had been slashed; he was bleeding several places; but he was on top of the protector, using his mass. Louis noticed the sharp-edged rock nearby, like a carefully flaked fist-ax, that would crush Chmee's skull. He released the trigger and aimed at the rock. Teela's hand flashed out for it and burst into flame.

*Surprise, Teela!*

*Tanj, the smell! I'll kill you for the smell of tree-of-life!*

A hand gone and a lower leg: Teela should be handicapped by that, but how badly had she damaged Chmee? They must have been tiring, because Louis caught a clear glimpse of Teela's hard bink in Chmee's thick neck. Chmee twisted, and for an instant there was nothing behind Teela's misshapen skull but blue sky. Louis waved the light into her brain.

It took Louis and Chmee pulling together to open Teela's jaws where they were locked in Chmee's throat. "She let her instincts fight for her," Chmee gasped. "Not her mind. You were right, she fought to lose. Kdapt help me if she had fought to win."

And then it was over, except for the blood leaking into Chmee's fur; except for Louis's bruised and possibly broken ribs, and the pain that twisted him sideways; except for the smell, the smell of *tree-of-life*, and that went on and on. Except for Harkabeeparolyn, now standing in pond water up to her knees, mad-eyed and frothing at the mouth as she fought to punch her helmet open.

Larry Niven

They took her arms and led her away. She fought. Louis fought too: he fought to keep walking away from the rows and rows of *tree-of-life*.

Chmee stopped in the corridor. He undogged Louis's helmet and pulled it away. "Breathe, Louis. The wind blows toward the farm."

Louis sniffed. The smell was gone. They took Harkabeeparolyn's helmet off to let the smell out of her suit. It didn't seem to matter. Her eyes were mad, staring. Louis wiped foam from her mouth.

The kzin asked, "Can you resist? Can you hold her from returning? And yourself?"

"Yah. Nobody but a reformed wirehead could have done it."

"Urrr?"

"You'll never know."

"I never will. Give me your flying belt."

The straps were tight. They must have hurt, cutting across Chmee's wounds. Chmee was only gone a few minutes. He came back with Harkabeeparolyn's flying belt, his own disintegrator, and two flashlight-lasers.

Harkabeeparolyn was calmer, probably through exhaustion. Louis was fighting a terrible depression. He barely heard Chmee say, "We seem to have won a battle and lost the war. What shall we do next? Your woman and I both need treatment. It may be we can reach the lander."

"We'll go through Needle. What do you mean, lost the war?"

"You heard Teela. Needle is in stasis, and we are left with nothing but our hands. How can we learn what any of this machinery does without Needle's instruments?"

"We won." Louis felt awful enough without the kzin's pessimism. "Teela isn't infallible. She's dead, isn't she? How would she know if the Hindmost was reaching for the stasis switch? Why should he?"

"With a protector in his ship, just a wall away?"

"Didn't he have a kzin trapped in that same room? That wall is General Products hull. I'd say the Hindmost reached to turn off the stepping disks. He was a little slow."

Chmee thought it over. "We have the disintegrator."

"And only two flying belts. Let's see, how far are we from Needle? Around two thousand miles, almost, back the way we came. Futz."

"What does a human do for a broken arm?"

"Splint." Louis got up. It was not easy to keep moving. He found a length of aluminum bar and had to be reminded what he wanted it for. They had nothing for bindings but superconductor cloth. Harkabeeparolyn's arm was swelling ominously. Louis bound her arm. He used the black thread to sew stitches where Chmee had been most deeply gashed.

They could both die without treatment, and there wasn't any treatment. And Louis might sit down and die, the way he was feeling. *Keep moving. Futz, it won't hurt any less if you stop moving. You've got to get over this sometime. Why not now?*

"Got to rig a sling between the flying belts. What can we use? Superconductor isn't strong enough."

"We must find something. Louis, I am too badly wounded to scout."

"We don't need to. Help me get this suit off Harkabeeparolyn."

He used the laser. He cut away the front of the pressure suit. He sliced the loose fabric into strips. He punched holes around the edges of what was left of the suit, and threaded strips of the rubberized fabric through it. The other ends he tied to the straps of his flying belt.

The suit had become a Harkabeeparolyn-shaped sling. They put her back into it. She was docile now, but she wouldn't speak.

Chmee said, "Clever."

"Thank you. Can you fly?"

"I don't know."

"Try it. If you have to drop out, and you feel better later,

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you'll still have a flying belt. Maybe we'll find a landmark big enough so that I can come back for you and find you again."

They set off down the corridor that had brought them here. Chmee's gashes were bleeding again, and Louis knew he was hurting. Three minutes into their journey they came to a disk six feet across, floating a foot in the air and piled with gear. They settled beside it.

"We might have known. Teela's cargo disk, by another of those interesting coincidences," Louis said.

"Another part of her game?"

"Yah. If we lived, we'd find it." Everything on the disk was strange to the eye, alien, except a heavy box whose bolts had been melted off. "Do you remember this? It's the medical kit off Teela's flycycle."

"It won't help a kzin. And the medicines are twenty-three Earth years old."

"Better than nothing, for her. You, you've got allergy pills, and there's nothing here to infect you. We're not close enough to the Map of Kzin to get kzinti bacteria."

The kzin looked bad. He shouldn't have been standing up. He asked, "Can you learn these controls? I don't trust myself to try them."

Louis shook his head. "Why bother? You and Harkbeeparolyn get on the disk. It's already floating. I'll tow it. You sleep."

"Good."

"Get her attached to the pocket 'doc first. And tie yourselves to the control post, both of you."

1.5 x 10<sup>12</sup>

**B**OTH OF THEM SLEPT through the next thirty hours, while Louis towed the disk. His ribs on the right side were one great red-and-purple bruise.

He stopped when he saw that Harkbeeparolyn was awake.

She babbled of the terrible compulsion that had gripped her, of the horror and delight of the insidious evil that was *tree-of-life*. Louis had been trying not to think about it. She waxed poetic as hell, and she wouldn't shut up, and Louis wouldn't tell her to. She needed to talk.

She wanted the comfort of Louis's arms around her, and he could give her that, too.

He also hooked Teela's old 'doc to his own arm for an hour. When the agony in his ribs had receded a little, and when he felt a little less woozy, he gave it back. There was still enough pain to distract him from a smell that was still with him. His flying belt might have brushed against *tree-of-life*. Or else—perhaps it was in his head. Forever.

Chmee had grown delirious. Louis made Harkbeeparolyn wear Chmee's impact armor. Teela had torn it open in the fight, but it was better than skin for a woman who planned to lie next to a delirious kzin.

The armor probably saved her life at least once, when Chmee slashed at her because she looked too much like Teela. She tended the kzin as best she could, feeding him water and nutrient from her pressure suit helmet. By the fourth day Chmee was rational, but still weak—and ravenous. The syrup in a human's pressure suit wasn't enough.

It took them four days in all to reach the approximate position of *Needle*, and another day cutting through walls until they found a solid block of fused basalt.

A week after it had solidified, the rock was still warm. Louis left his floating disk and passengers far down the tunnel down which Teela had towed *Needle*. He had his pressure suit helmet on, with clean air blowing into it, when he held the disintegrator two-handed and pressed the trigger.

A hurricane of dust blew back at him. A tunnel formed ahead of him, and he walked into it.

There was nothing to see, and no sound but the howl of basalt disintegrating and blowing past him, and lightning

somewhere behind him where the electron charges were reasserting their prerogatives. Just how much lava had Teela poured? It seemed he'd been at this for hours.

He bumped into something.

Yah. He was looking out of a window into a strange place. A living room, with couches and a floating coffee table. But everything looked soft, somehow; there wasn't a sharp edge or a hard surface anywhere: nothing that any living thing could bump a knee against. Through a farther window he could see huge buildings, and a glimpse of black sky between. Pierson's puppeteers swarmed in the streets. Everything was upside down.

That which he had taken for one of the couches, wasn't. Louis used his flashlight-laser at low intensity. He flicked it on and off. For a good minute nothing happened. Then a flattish white head and neck, emerging to drink from a shallow bowl, jerked in amazement and darted back under its belly.

Louis waited.

The puppeteer stood up. He led Louis around the hull—slowly, because Louis had to make his path with the disintegrator—to where he had placed a stepping disk transmitter on the outside of the hull. Louis nodded. He went back for his companions.

Ten minutes later he was inside. Eleven minutes later, he and Harkbeeparolyn were eating like kzinti. Chmee's hunger was beyond description. Kawareskenjakow watched him in awe. Harkbeeparolyn hadn't even noticed.

Ship's morning, for a spacecraft buried in congealed lava, tens of miles beneath the sunlight.

"Our medical facilities are crippled," the Hindmost said.

"Chmee and Harkbeeparolyn must heal as best they can."

He was on the flight deck, speaking via the intercom system; and that might or might not have been significant. Teela was gone, and the Ringworld might survive. The puppeteer suddenly had a long, long lifespan to protect. Rubbing shoulders with aliens was contraindicated.

"I have lost contact with both the lander and the probe," the puppeteer said. "The meteor defense flared at about the time the lander stopped sending, for whatever significance that may have. Signals from the damaged probe stopped just after Teela Brown tried to invade *Needle*."

Chmee had slept (on the water bed, quite alone) and eaten. His restored pelt would bear interesting scars once again, but the wounds were healing. He said, "Teela must have destroyed the probe as soon as she saw it. She could not force herself to leave a dangerous enemy behind her."

"Behind her? Who?"

"Hindmost, she called you more dangerous than a kzin. A tactical ploy, to insult us both, no doubt."

"Did she indeed?" Two flat heads looked into each other's eyes for a moment. "Well. Our resources have dwindled to *Needle* itself and a single probe. We left that probe on a peak near the floating city. It still has working sensors, and I have signalled it to return, in case we think of a use for it. We should have it available in six local days."

"Meanwhile we seem to have our original problem back, with additional clues and additional complications. How to restore the Ringworld's stability? We believe that we are in the right place to begin," the Hindmost said. "Don't we? Teela's behavior, inconsistent for a being of acknowledged intelligence...?"

Louis Wu made no comment. Louis was quiet this morning.

Kawareskenjakow and Harkbeeparolyn sat cross-legged against a wall, close enough so that their arms were touching. Harkbeeparolyn's arm was padded and in a sling. From time to time the boy glanced at her. She puzzled and worried him. She was running on painkillers, of course, but that wasn't enough to account for her torpor. Louis knew he ought to talk to the boy—if he knew what to say.

The City Builders had slept in the cargo hold. Fear of falling

THE RINGWORLD ENGINEERS



would have kept Harkabeeparolyn out of the sleeping field in any case. She had offered *rishathra*, without urgency, when Louis joined them for breakfast. "But be careful of my arm, Luweewu."

Refusing sex took tact in Louis's culture. He had told her that he was afraid of jarring her arm, which he was. It was equally true that he couldn't seem to work up an interest. He wondered if *tree-of-life* had affected him so. But he sensed no lust in himself for yellow roots, nor even for a wire trickling electric current.

This morning he seemed to have no strong urges at all.

Fifteen hundred billion people...

The Hindmost said, "Let us accept Louis's judgment regarding Teela Brown. Teela brought us here. Her intent matched our own. She gave us as many clues as she could. But what clues? She was fighting both sides of a battle. Was it important for her to create three more protectors, then kill two of them? Louis?"

Louis, lost in thought, felt four sharp points prick his skin above the carotid artery. He said, "Sorry?"

The Hindmost started to repeat himself. Louis shook his head violently. "She killed them with the meteor defense. She fired the meteor defense, twice, at targets other than our vitally necessary selves. We were allowed to watch it without being in stasis at the time. Just another message."

Chmee asked, "Do you assume that she could have chosen other weapons?"

"Weapons, times, circumstances, number of operating protectors—she had considerable choice."

"Are you playing games with us now, Louis? If you know something, why not tell us?"

Louis's guilty glance at the City Builders showed Harkabeeparolyn trying to stay awake, Kawaresksenjajok listening intently. A pair of self-chosen heroes waiting their chance to help save the world. *Tanji*. He said, "One point five trillion people."

"To save twenty-eight point five trillion, and ourselves."

"You didn't get to know them, Chmee. Not as many, anyway. I was hoping one of you would think of this. I've been thrashing around in my head trying to see some—"

"Know them? Know who?"

"Valavirgillin. Ginjerofer. The King Giant. Mar Korssil. Laliskareerlyar and Fortaralisplyar, Herders, Grass Giants, Amphibians, Hanging People, Night People, Night Hunters... We're supposed to kill five percent to save ninety-five percent. Don't those numbers sound familiar to you?"

It was the puppeteer who answered. "The Ringworld's attitude jet system is five percent functional. Teela's repair crew remounted them over five percent of the arc of the Ringworld. Are these the people who must die, Louis? The people on that arc?"

Harkabeeparolyn and Kawaresksenjajok stared in disbelief. Louis spread his arms, helpless. "I'm sorry."

The boy cried, "Luweewu! Why?"

"I promised," said Louis. "If I hadn't promised, maybe I'd have a decision to make. I told Valavirgillin I'd save the Ringworld no matter what it took. I promised I'd save her, too, if I could, but I can't. We don't have time to find her. The longer we wait, the bigger the force pushing the Ringworld off center. So she's on the arc. So's the floating city, and the Machine People empire, and the little red carnivores, and the Grass Giants. So they die."

Harkabeeparolyn beat the heels of her hands together. "But this is everyone we know in the world, even by reputation!"

"Me, too."

"But this leaves nothing worth saving! Why must they die? How?"

"Dead is dead," said Louis. Then, "Radiation poisoning. Fifteen hundred billion people of twenty or thirty species. But only if we do everything exactly right. First we have to find out where we are."

Larry Niven



Courtney Skinner

The puppeteer asked, reasonably, "Where do we need to be?"

"Two places. Places that control the meteor defense. We have to be able to guide the plasma jets, the solar flares. And we have to disconnect the subsystem that causes the plasma jet to lase."

"I have already found these places," the Hindmost said. "While you were gone, the meteor defense fired, possibly to destroy the lander. Magnetic effects scrambled half my sensor equipment. Nonetheless I traced the origin of the impulse. The massive currents in the Ringworld floor that make and manipulate solar flares, derive from a point beneath the north pole of the Map of Mars."

Chmee said, "Perhaps the equipment must be cooled—"

"Futz that! What about the laser effect?"

"Activity there came hours later: smaller electrical effects, patterned. I told you of this source. It is just over our heads, by ship's orientation."

"I take it we must disconnect this system," Chmee said.

Louis snorted. "It's easy. I could do it with a flashlight-laser, or a bomb, or the disintegrator. Learning how to make solar flares will be the hard part. The controls probably weren't designed for idiots, and we don't have too much time."

"And afterward?"

"Then we put a blowtorch against inhabited land."

"Louis! Details!"

He would be speaking a death sentence for a score of species.

Kawareskenjak wouldn't show his face. Harkabee-parolyn's face was set like stone. She said, "Do what you must."

He did. "The attitude jet system is only five percent operational."

Chmee waited.

"Operating fuel is hot protons streaming from the sun. The solar wind."

The puppeteer said, "Ah. We flare the sun to multiply the fuel intake by a factor of twenty. Life forms beneath the flare die or mutate drastically. Thrust increases by the same factor. The attitude jets either take us to safety, or explode."

"We don't really have time to redesign them, Hindmost."

Chmee said, "Irrelevant, unless Louis is totally wrong. Teela inspected those motors while mounting them."

"Yah. If they weren't strong enough, she talked herself into adding an overdesign safety factor. Guarding against the mischance of a large solar flare. She knew that was possible. Doublethink."

"To guide the flare is not necessary to us, merely convenient," the kzin continued. "Let the laser-generating subsystem be disconnected. Then, if need be, *Needle* may be placed where we want the flare to fall, then used as a target: accelerated until the meteor defense fires. *Needle* is invulnerable."

Louis nodded. "We'd like something a little more accurate. We'd do the job faster and kill less people. But...yah. We can do it all. We can do it."

The Hindmost came with them to inspect the components of the meteor defense. Nobody talked him into that. The sensor devices they dismantled from *Needle* had to be operated by a puppeteer's lips and tongue. When he suggested teaching Louis how to manipulate the controls using a pick and tweezers, Louis laughed at him.

He spent some hours in the blocked section of *Needle*. Then he followed them out through the tunnel. His mane was dyed in streaks of a hundred glowing colors, and beautifully groomed. Louis thought, *everyone wants to look good at his own funeral*, and wondered if that was it.

It wasn't necessary to use a bomb on the laser subsystem. Finding the off switch took the Hindmost a full day, and a diskload of the dismantled instruments, but it was there.

The web of superconductor cables had its nexus in the *scrith*, twenty miles beneath the north pole of the Map of Mars. They found a central pillar twenty miles tall, a sheath of *scrith* enclosing the cooling pumps for the Map of Mars. The complex at the bottom must be the control center, they decided. They found a maze of huge airlocks, and each had to be passed by solving some kind of design puzzle. The Hindmost handled that.

They passed through the last door. Beyond was a brightly lighted dome, and dry-looking soil with a podium in the center, and a smell that sent Louis spinning around, running for his life, towing a bewildered Kawareskenjak by his thin wrist. The airlock was closed before the boy started to fight. Louis batted him across the head and kept going. They had passed through three airlocks before he let them stop.

Presently Chmee joined them. "The path led across a patch of soil, beneath artificial sunlights. The automated gardening equipment has failed, and few plants still grow, but I recognized them."

"So did I," said Louis.

"I knew the smell. Mildly unpleasant."

The boy was crying. "I didn't smell anything! Why did you throw me around like that? Why did you hit me?"

"Flup," said Louis. It had finally occurred to him that Kawareskenjak was too young; the smell of *tree-of-life* wouldn't mean anything to him.

So the City Builder boy stayed with the aliens. But Louis *Wu* didn't see what went on in the control room. He returned to *Needle* alone.

The probe was still far around the Ringworld, light-minutes distant. A hologram window, glowing within the black basalt outside *Needle*'s wall, looked out through the probe's camera: a dimmed telescopic view of a sun somewhat less active than Sol. The Hindmost must have set that up before he left.

The bone in Harkabee-parolyn's arm was healing slightly crooked; Teela's old portable 'doc couldn't set it. But it was healing. Louis worried more about her emotional state.

With nothing of her own world around her, and flame about to take everything she remembered—call it culture shock. He found her on the water bed watching the magnified sun. She nodded when he greeted her. Hours later she hadn't moved.

Louis tried to get her talking. It wasn't good. She was trying to forget her past, all of it.

He found a better approach when he tried to explain the physical situation. She knew some physics. He didn't have access to *Needle*'s computer and hologram facilities, so he drew diagrams on the walls. He waved his arms a lot. She seemed to understand.

On the second night after his return, he woke to see her cross-legged on the water bed, watching him thoughtfully, holding the flashlight-laser in her lap. He met its glassy stare, then swung his arm in circles to turn himself over and went back to sleep. He woke up next morning, so what the tanj.

That afternoon, he and Harkabee-parolyn watched a flame rise from the sun, licking out, and out, and out. They said very little.

## EPILOGUE

**O** NE *FALAN* LATER: TEN RINGWORLD ROTATIONS. Far up the arc of the Ringworld, twenty-one candle flames glowed brightly, as brightly as the corona of the hyperactive sun showing around the edges of a shadow square.

*Needle* was still embedded in basalt beneath the Map of Mars. *Needle*'s crew watched in a hologram window, courtesy of the probe's cameras. The probe had been brought to rest at the cliff-edge of the Map of Mars, on carbon dioxide snow, where martians were not likely to tamper with it.

Between those two rows of candle flames, plants and animals and people would be dying. In numbers that would make human space look empty, the plants would be withering or growing strangely. Insects and animals would breed, but not

according to their kind. Valavirgillin would be wondering why her father had died and why she was throwing up so often and whether it was part of the general doom and what was the Star People man doing about it all?

But none of that showed from fifty-seven million miles away. They saw only the flames of the Bussard ramjets burning enriched fuel.

"I am pleased to announce," the Hindmost said, "that the center of mass of the Ringworld is moving back toward the sun. In another six or seven rotations we can set the meteor defense as we found it, to fire on meteors. Five percent of attitude jet efficiency will be enough to hold the structure in place."

Chmeeee grunted in satisfaction. Louis and the City Builders continued to stare into the hologram glowing in a depth of black basalt.

"We have won," the Hindmost said. "Louis, you set me a task whose magnitude compares only to the building of the Ringworld itself, and you set my life at stake. I can accept your arrogance, now that we have won, but there are limits. I will hear you congratulate me or I will cut off your air."

"Congratulations," said Louis Wu.

The woman and boy on either side of him began to cry. Chmeeee snorted. "To the victor belongs the right to gloat, at minimum. Do the dead and dying bother you? Those worth your respect would have volunteered."

"I didn't give them the chance. Look, I'm not asking *you* to be guilt-ridden—"

"Why should I be? I mean no offense, but the dead and dying are all hominids. They are not of your species, Louis, and they are certainly not of mine, nor of the Hindmost's. I am a hero. I have saved the equivalent of two inhabited worlds, and their populations are of my species, or nearly so."

"All right, I see your point."

"And now, with advanced technology to back me, I intend to carve out an empire."

Louis found himself smiling. "Sure, why not? On the Map of Kzin?"

"I thought of that. I believe I prefer the Map of Earth. Teela told us that kintzi explorers rule the Map of Earth. In spirit they may resemble my world-conquering people more nearly than the decadents of the Map of Kzin."

"You know, you're probably right."

"Furthermore, they of the Map of Earth have fulfilled an ancient daydream of my people."

"Oh?"

"Conquering Earth, you idiot."

It had been long since Louis Wu laughed. Conquering plains apes! "Sic transit gloria mundi. How do you plan to get there?"

"It should be no great feat to free *Needle* and guide it back to Mons Olympus—"

"My ship," the Hindmost said gently; but his voice cut through Chmeeee's. "My controls. *Needle* goes where I will it."

An edge in Chmeeee's voice. "And where might that be?"

"Nowhere. I feel no strong urge to justify myself," the Hindmost said. "You are not my species, and how can you harm me? Will you burn out my hyperdrive motor again? Yet you are allies. I will explain."

Chmeeee was up against the forward wall, giving the puppeteer his full attention. Claws extended. Fur fluffed around his neck. Naturally.

"I have violated tradition," said the Hindmost. "I have continued to function when death might touch me at any second. My life has been at stake for nearly two decades, with the risk rising almost asymptotically. The risk is over, and I am exiled, but I live. I want to rest. Can you empathize with my need to take a long rest? In *Needle* I have as many of the comforts of home as I will ever see. My ship is safely buried in rock, between two layers of *scrith*, which compares in strength to *Needle*'s own hull. I have quiet and safety. If later I feel the need to explore, a billion cubic miles of Ringworld Repair Center is just outside. I am just where I want to be, and I will stay."

Larry Niven

Louis and Harkabeeparolyn did *rishathra* that night. (No: they made love.) They hadn't done that in some time. Louis had feared that the urge was gone. Afterward she told him.

"I have mated with Kawaresksenjakok."

He'd noticed. But she meant permanently, didn't she? "Congratulations."

"This is not the place to raise a child." She had not bothered to say, *I'm pregnant*. Of course she was pregnant.

"There must be City Builders all over the Ringworld. You could settle anywhere. In fact, I'd like to come with you," Louis said. "We saved the world. We'll all be heroes, assuming anyone believes us."

"But, Louis, we can't *leave*! We can't even breathe on the surface, our pressure suits are in shreds, and we are in the middle of the *Great Ocean*!"

"We're not desperate," said Louis. "You talk as if we'd been left naked between the Clouds of Magellan. *Needle* isn't our only transportation. There are thousand of those floating disks. There's a spacecraft so big that the Hindmost could pick out the details on deep-radar. We'll find something in between."

"Will your two-headed ally try to stop us?"

"Contrarywise. Hindmost, are you listening?"

The ceiling said, "Yes," and Harkabeeparolyn jumped.

Louis said, "You're in the safest place imaginable on the Ringworld. You said so yourself. The most unpredictable threat you face has to be the aliens aboard your own ship. How would you like to get rid of us?"

"I would. I have suggestions. Shall I wake Chmeeee?"

"No, we'll talk tomorrow."

The water began to condense just at the cliff-edge. From there it streamed downward. It became a vertical river, a waterfall twenty miles tall. The bottom was a sea of mist reaching hundreds of miles out to sea.

The probe camera that looked down the side of the Map of Mars showed them nothing but falling water and white mist.

"But in infrared light the picture is different," the Hindmost said. "Observe—"

The mist hid a ship. A narrow triangle of a ship, oddly designed. No masts. Just a second, thought Louis. Twenty miles down. "That thing must be a full mile long!"

"Nearly that," the Hindmost agreed. "Teela told us she had stolen a kintzi colony vessel."

"Okay," Louis had already decided, that quick.

"I detached an intact deuterium filter from the probe Teela later destroyed," the Hindmost said. "I can fuel that ship. Teela's journey was grueling, but yours need not be. You may take floating disks for exploring, and for trade goods when you reach shore."

"Good idea."

"Will you want a working droud?"

"Don't ever ask me that again, okay?"

"Okay. Your answer is evasive."

"Right. Can you dismount a pair of stepping disks from *Needle* and install them in the ship? It'd give us something to fall back on if we hit real trouble." He saw the puppeteer eye to eye with himself, and he added, "It could save your life. There's still a protector around, and he won't have to leave the Ringworld now, thanks to us."

"I can do that," the Hindmost said. "Well, is this an adequate means to reach the mainland?"

Chmeeee said, "Yes. A long voyage... a hundred thousand mile journey. Louis, your people suppose a sea voyage to be restful."

"On this sea, it's more likely to be entertaining. We wouldn't have to head straight to spinward. There's the Map of an unknown world to antispinward, and it's less than twice as far." Louis smiled at the City Builders. "Kawaresksenjakok, Harkabeeparolyn, shall we check out some legends for ourselves? And maybe make a few."

—G—

# The Aleph

## Andrew A. Whyte

For the sake of brevity and convenience, certain abbreviations have been supplied as a reference code. They will be found on the right-hand side. Here is a key: (C) Collection (more than one story by the same author); (C+) Story series collected or collection with unifying theme; (F) Fantasy; (J) Juvenile; (O) Omnibus (Collection containing at least one novel). Since SF novels make up the majority of books listed, none of these are specified as such. We have recently added new symbols to deal with the increasing amount of illustrated fiction. (GG) Graphic Novel; (GS) Graphic Story; and (GC) Graphic Collection—are used to denote books of which approximately equivalent portions are shared between text and artwork.

ANDERSON, Paul (F)  
BROXON, Mildred Dowsy  
**The Demon of Scattery**  
Illustrations by Alicia Austin  
Acelarge-format/December/\$4.95  
Paul Anderson and a new collaborator tell an historical fantasy set in ancient Ireland. In the twilight of the old gods, the arrival of a viking evokes their curse and briefly awakens the elder magic.

ASPRIN, Robert  
Tambo  
Acelarge-format/November/\$4.95  
A sympathetic view of an "interstellar Genghis Khan," the struggles by which he rose to rule an empire and the price he paid to hold it. [The fleet of pirates and criminals under his command established and maintained a reign of terror and extortion successfully defying all efforts of the Defense Alliance to halt or curb their activities.]

Myth Conceptions  
Illustrations by Kelly Freas  
[Aahaz & Skeve series, No. 2]  
Starblaze/December/\$4.95

BALLARD, J.G.  
**The Unlimited Dream Company**  
Holt, Rinehart & Winston/November \$10.95  
Published simultaneously in the UK by Jonathan Cape.

This is an offbeat parable, told (or so say advance reports) with economy and clarity of intent, about the apparant

death and transfiguration of an obsessed young ne'er-do-well.

BEAR, David  
Keeping Time  
St. Martin's Press/November/\$8.95  
We're back in apocalyptic, run-down New York, 1999, this time for a [blend of science fiction and detective story with a gimmick. Five prominent citizens] have been robbed of the extra hours they had saved via their "time-keeper" implants.

BESTER, Alfred  
**The Stars My Destination: Volume Two**  
Text adapted by David Preiss  
Illustrations by Howard Chaykin  
Baronet/November/\$15.95 & \$8.95  
Postponed from July.  
A Byron Preiss Production.

BETHANCOURT, T. Ernesto (J)  
Nightmare Town  
Holiday House/September/\$7.95  
For ages 12 and up.

The inhabitants of Celestial, Arizona, are curiously deformed and the town is ruled by a strange religious sect. When his girlfriend is kidnapped, sixteen-year-old Jimmy Hunter intervenes and discovers [an extraordinary space alien which has unwittingly held the town in its power for over a hundred years].

BIGGIE, Lloyd, Jr.  
The Whirlwind of Time  
[Jan Dazek series, No. 5]  
Doubleday/November/\$7.95

Jan Dazek has apparently given up his private eye job back on Earth in order to troubleshoot full time for the Supreme Council. In this new adventure he has to contend with a teleporting radiation victim, a planet-incinerating extortion threat and the usual ubiquitous odd aliens.

BUNTING, Eve (J)  
The Cleverest Switch  
Lippincott/September/\$7.95  
For ages 12 and up.

A boy notices changes in his girl friend which seem to be connected to a small black box and an alien invasion.

BURROUGHS, William S. [adaptor]  
Blade Runner  
Blue Wind Press/May/\$3.95  
[Box 7175/Berkley/CA 94707]  
Characters and situations adopted from THE BLADE RUNNER by Alan E. Nourse.

CARTER, Lin  
Journey to the Underground World  
DAW/November/\$1.75  
First of a new series.

Lin Carter is a one-man pulp revival. It would seem that he has now written over a hundred books. This one is the start of a lost-world adventure series modeled on Edgar Rice Burroughs's Pellucidar [monster flying beasts... lovely Cro-Magnon maidens... dinosaurs... bestial Neanderthals, etc.]

CHAYKIN, Howard [art & text] (FGS)  
**The Swords of Heaven, The Flowers of Hell**

Heavy Metal/November/\$6.95  
From an original concept by Michael Moorcock.

[Eternal Champion Mythos]  
John Dakar is a [contemporary man plagued with the memory of previous incarnations]. Giving himself up to the strange voices that call him to his destiny, he takes up the Black Sword.

COATES, Joseph K. (F)  
**The Gentle Dragon**  
Lane & Associates/May/\$4.95  
[P.O. Box 3063/La Jolla CA 92038]

CONEY, Michael G.  
Charisma  
Dell/December/\$1.95  
First publication in UK (1975) by Gollancz.

[A secret research station in Cornwall discovers a whole series of parallel worlds, each a slightly distorted reflection of our own. The only person who can travel between worlds is the one whose doppleganger in the parallel world has recently died.] This is the background for a novel of love and murder in which several characters die more than once. Like the author, the protagonist is the manager of a hotel.

COOK, Glen (F)  
A Shadow of All Night Falling  
Berkley Showcase Original/December/\$1.95

[The inhabitants of Celestial, Arizona, are curiously deformed and the town is ruled by a strange religious sect. When his girlfriend is kidnapped, sixteen-year-old Jimmy Hunter intervenes and discovers [an extraordinary space alien which has unwittingly held the town in its power for over a hundred years].

COPPER, Basil (F)  
Necropolis  
Arkham House

CORBEN, Richard [art] (F/GS)  
STRAND, Jan [text]  
New Tales of the Arabian Nights  
Heavy Metal/September/\$7.95

COVER, Arthur Byron  
An East Wind Coming  
Berkley/November/\$1.95

Another adventure of Sherlock Holmes—another encounter with Jack the Ripper—only this takes place two million years in the future!

DALEY, Brian  
Hale Solo's Revenge  
delRey/November/\$8.95  
[A Star Wars Novel]  
[Based on the characters and situations created by George Lucas]  
SF Book Club/February, 1980/\$2.95 &+

Stranded [on the edge of the Corporate Sector Authority's domain], Han Solo and his Wookiee sidekick, Chewbacca, agree to take on a high-paying job with no questions asked. When Han discovers he's running a cargo of slaves, he tries to buck his boss and is soon actively pursued by both his employers and the Authority, separated from Chewie and involved with a shady lady.

DAY, Gene (GC)  
Future Day  
Flying Buttress Publications/August/

Collector's Edition (500 copies): \$18.00  
[P.O. Box 83/University Station/Syracuse NY 13210]

DICKSON, Gordon R.  
On the Run  
Ace/November/\$1.95  
Reissue/Nov  
Previously published as MANKIND ON THE RUN.

EKLUND, Gordon  
Devil World  
Bantam/November/\$1.75  
[A Star Trek Novel]

Interest in Star Trek is expected to be at an all-time high with the new movie

scheduled to open about a month after this book hits the stands. Eklund's second ST novel takes us to Heartland, [a mysterious planet populated by a small but terrifying race of demonic beings, where Captain Kirk falls in love with a beautiful mysterious woman with a fatal secret and the crew of the Enterprise has to contend with a...]

ELFLANDSSON, Galad (F)  
**The Black Wolf**  
Donald M. Grant/October/\$12.00

Illustrations by Randy Broecker  
[a short fantasy novel reminiscent of Lovecraft by a promising young Canadian writer whose nom de plume was first encountered in the recent eponymously titled HEROIC FANTASY anthology edited by Hank Reinhardt and Jerry Page.

ESTELMAN, Loren D.  
Dr. Jekyll and Mr. Holmes  
Doubleday/November/\$8.95

John H. Watson, M.D., the author of SHERLOCK HOLMES VS. DRACULA (Doubleday, 1977), reveals the true story behind Robert Louis Stevenson's purported creation of the world's first chemically induced immortal split personality. Estleman is said to carry off the pastiche better than most, but... For those with obsessive recombinative de Ja.

FARMER, Philip Jose (C+)  
Riverworld and Other Stories  
Berkley/November/\$2.25  
[Riverworld series, No. 4]

Readers expecting the fourth novel in the Riverworld series, THE MAGIC LABYRINTH, which was originally anticipated for this fall but now may not appear until a year hence, may take consolation from this new book, featuring previously uncollected shorter works, including a revised and much-expanded version of the title story, first published in Worlds of Tomorrow in 1966 (the one that features Jesus Christ and Tom Mix).

FOSTER, Alan Dean [adaptor]  
**The Black Hole**  
Ballantine/delRey/December/\$1.95

Adapted from the screenplay by Jeb Rosebrock & Gerry Day  
Foster than a speeding propeller, the reigning king of the SF movie/adaptors has produced the novelization of the Disney Studios' big-budget space adventure, due out in December. A media blitz should soon make everyone familiar with the story. [Our sister publication, the Science Fiction Times, has recently acquired a color graphics adaptation by Jack Kirby.]

GOLDBERGER, Judith M. (J)  
**The Looking Glass Factor**  
Dutton/November/\$7.95

For ages 9 to 11  
Through genetic experimentation, cats have become the second intelligent race on a 29th-century Earth in this novel for younger readers. Two Cat scientists and a human child are experimenting with a new discovery—a way of literally merging with physical objects.]

HINCHCLIFFE, Philip [adaptor]  
Doctor Who and the Masque of Mandragora

Pinnacle/November/\$1.75  
[Doctor Who series, No. 8]

First publication in UK by W.H. Allen.  
Sinister doctors in Renaissance Italy. A malevolent energy being attempts to



make use of a secret black magic cult to take over. The Doctor must combat both these as well as the machiavellian plots of a villainous duke.

**HOLDSTOCK, Robert** (F)  
Necronator  
Avon/December/\$2.50  
First publication in UK (1978) by Futura.

An evil spirit ensconced within an ancient basilical font is the operating menace in this contemporary novel of occult suspense by an up-and-coming British author better known for his SF (EYE, AMONG THE BLIND and EARTHWIND).

**HOUSTON, David**  
Gods In A Vortex  
Leisure Books/December/\$1.75  
Illustrations by the author.

The second novel by the author of ALIEN PERSPECTIVE (Tower, 1978). He is a feature writer for Starlog.

**HOWARD, Robert E.** (C+)(F)  
Jews of Gwahlur  
Illustrations by Dean Morrissey.

**Black Colossus**  
Donald M. Grant/October/\$20.00  
Illustrations by Ned Dameron  
[Illustrated Conan series, Nos. 8 & 9]

**KNOBEL, Philip**  
Mr. Moon  
Jove/June/\$1.95

**KUPPERBERG, Paul** [adaptor]  
Mandrill  
Pocket Books/November/\$1.95  
[Hulk & Spider-Man series]

**LEM, Stanislaw** (C+)  
Tales of Pirx the Pilot  
Harcourt Brace Jovanovich/December/\$7.95  
Translated from the Polish by Louis Ibarne.

These five stories are perhaps the most likely to appeal to the average SF reader of all the fiction being published in English to date. Pirx is a character who would not have been out of place in the pages of the "Golden Age". Astounding. His learning experiences as he trains to become a pilot, undertakes a rescue mission, achieves seniority, etc. are not pastiches of the fiction that era nor is the author's intent here the barbed satire with which he has become associated (and which some find heavy-handed).

**LUPOFF, Richard A.** (C+)  
The Ova Hamlet Papers  
Pennyfarthing Press/July/\$5.95  
Illustrations by Trina Robbins.  
Introduction by Philip Klass 1000-copy edition.

Parodies of writers too well-known to mention (Dick, Ballard, Vonnegut, Lovecraft, Matzberg, Ellison, and L. Ron Hubbard) which first appeared in Fantastic between 1969 and 1976.

**Nebogipfel at the End of Time**  
Underwood-Miller/July/\$3.50  
350-copy edition.  
20-page chapbook edition of story published in Heavy Metal (September, 1978).

**McDONALD, George** (F)  
The Portent A Story of Second Sight  
Harper & Row/November/\$7.95  
Introduction by Glen Sadler.  
Designed by Maurice Sendak.

Drew Whyte

**McGREGOR, Don**  
The Variable Syndrome  
Fictioneer Books/October/\$10.00  
Illustrations by John Byrne & Terry Austin.

**McINTYRE, Vonda N.** (C)  
Firefold and Other Stories  
Houghton, Mifflin/December/\$10.95  
This is the first collection of shorter fiction by the author who recently won both Nebula and Hugo Awards for her novel, DREAMSNAKE.

**MACLEAN, Katherine** (C)  
The Trouble With You Earth People  
Starblaze/December/\$4.95  
Illustrations by Kelly Freas.  
Postponed from earlier date.

**MASSA, Jack**  
Mooncow  
Berkley/December/\$1.95  
[Science and magic cross blades] in this far-future adventure fantasy by a new author compared by the publisher to Rafael Sabatini. Some time following another ice age, [Mooncow, Entertainer and healer, wizard and warrior, sword-wielder, cardsharp and spy] is the "one-man army" chosen to stop the advance of the Moldofa Empire.

**MORRIS, Jim**  
The Sherrif of Purgatory  
Doubleday/December/\$7.95  
Purgatory County, Arkansas, is one of a very few havens from the anarchy that followed the collapse of the United States after a [disastrous war with Russia]. Laid-back Frank Spurlock, the eponymous hero of this first novel, decides to make a trip to New York City to rescue his wife and children, but they are waylaid by an agent of the Mafia.

**MUNN, H. Warner** (C+)(F)  
Tales of the Werewolf Clan: One  
Donald M. Grant/October/\$12.00  
Illustrations by Jeff K. Potter.

**NEUVOLE, Donald** (F)  
Eternal Life  
Avon (trade)/October/\$4.95  
A middle-aged author discovers that, off and on, he has the ability to travel through other realms of consciousness. Daring about the astral plane in search of the reason for the suicide of his childhood sweetheart, he is guided by the oddly sensible spirits of celebrated figures of science and literature.

**NICHOLS, Robert**  
Eden Book IV of "Daily Lives in Nighsi-Alai"  
New Directions/October/\$3.95  
The final volume in an utopian speculative fiction about a non-existent contemporary Asian state and its instructive attempts to achieve political and ecological harmony.

**NIVEN, Larry**  
The Ringworld Engineers  
Phantasia Press/December/\$30.00  
500-copy limited edition signed & numbered.  
Serialized in Galileo (Nos. 13-16) to be published by Holt, Rinehart & Winston in February, 1980.

**NOIR, Stephaud**  
Alien Plague  
Carlyle/November/\$1.95  
3021. Out by the rings of Saturn, an unknown force confronts the crew of the spaceship Brandywine. The curious first name masks the thin identities of pseudonymous contributors.

**O'DONNELL, Kevin (Jr.)**  
Mayflies  
Berkley (A Showcase Original)/  
December/\$1.95  
Title in manuscript: "Mayflies and Other Spaced Spirts."

An "ordinary man" awakens from an accident after twenty years to find himself the [computer brain-core of a world-sized ship shepherding twenty-five thousand humans on a thousand-year journey to the stars]. This is the second novel from the author of BANDER SNATCH (published by Bantam in June), who needs no introduction to Galileo readers.

**PALUMBO, Dennis**  
City Wars  
Bantam/December/\$1.95  
A new author from L.A. takes us to a 22nd-century America [wrecked by a devastating civil war]. The few remaining cities have become "bastions of armament," with mounted gun emplacements on the tops of buildings," etc. Since everyone has been out of contact for years, no one knows against whom to retaliate when an attack comes.

**PAUL, Barbara**  
Bibblings  
NAL Signet/November/\$1.75  
Attempts to bring a mineral-rich new world into the Federation are complicated by the fact that the planet is at war. There are approved techniques for handling such situations, but everyone on Lodor-Kamaria is insane! The third novel in a year's time by an author of whom we will be hearing still more. (New American Library is publishing her UNDER THE CANOPY next May.)

**PRESCOT, Dray** [as told to Alan Burt Akers]  
A Fortune For Kregen  
DAW/December/\$1.75  
[Prescot series, No. 21; Jakaida Cycle: III]  
Illustrations by Richard Hescox.  
[Prescot fights his way through the catacombs of illusion and the treasure tunnels of a cunning race of monsters.]

**PRICE, E. Hoffman** (F)  
The Devil Wives of Li Fong  
Ballantine-delRey/December/\$1.95  
A fantasy set in ancient (T'ang Dynasty) China. Two female "spirit

devils," desirous of becoming human, take on the form of high-born ladies and persuade an apprentice apothecary to marry them. All goes well until the intervention of a "wicked monk" threatens them with a return to their dreaded original forms.

**PRIEST, Christopher** (C)  
An Infinite Summer  
Scribner's/October/\$8.95  
First publication in U.K. (1969) by Faber & Faber.

Of the five stories that comprise this book, three ("The Watched," "The Negation" and the lyrical, terrifying, "Whores") are set in the 'Dream Archipelago' series, the setting for two projected novels. The two remaining stories combine time travel and Victorian romance.

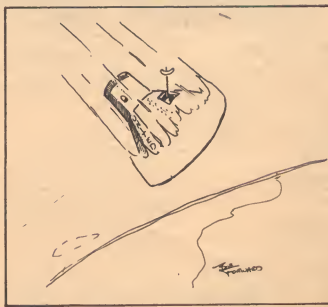
**PURTILL, Richard L.** (F)  
The Golden Gryphon Feather  
DAW/December/\$1.75  
First of a trilogy.  
Illustrations by George Barr.

[Wizardry and witchcraft in the ancient lost land of Kaphru in the days before the rise of Minoan Crete...a captive princess, a fabled monster, magicians and students of primitive science.] High fantasy, the first published fiction by an academic philosopher who has also written a book about C.S. Lewis.

**REAMY, Tom** (C+)  
San Diego Lightfoot Sue and Other Stories  
EarthLight Publishers/October/\$14.95  
(\$539 Jackson/Kansas City MO 64130)  
100-copy slipcase edition: \$25.00  
Introduction by Harlan Ellison.  
Appreciation of the author by Howard Waldrop.  
Endpapers by Leo & Diane Dillon. Formerly announced for publication by Heritage Press.

**RICHMOND, Walt and Leigh**  
Phase Two  
Ace/December/\$1.95  
Integral version of PHOENIXSHIP.  
Published by in an edited version by Ace in 1969.

**ROBESON, Kenneth**  
Mystery On Happy Bones  
Bantam/October/\$1.75  
[Doc Savage series, No. 96]



RODDENBERRY, Gene  
**Star Trek—The Motion Picture: A Novel**  
 Pocket Books/December/\$2.25

A thirteen-book selection of associated titles is but one element in the publicity campaign for the upcoming movie. The novel is based on a screenplay by Harold Livingston from a story by Roddenberry and Alan Dean Foster.

ROGERS, Mark E. (F)  
**The Rustemone**  
 The Burning Bush Press/August/\$3.95  
 (Erwin E. Bush/P.O. Box 7708/Newark DE 19711)

ROYAL, Brian James (J)  
**Star Chase**  
 Elsevier-Nelson/November/\$8.95

Justly condemned and sent to a prison planet, Reed Norvach is liberated by the agent of a criminal who wants him to combat a fabled, life-destroying energy force currently wreaking havoc in a parallel universe.

SHECKLEY, Robert (C)  
**The Wonderful World of Robert Sheckley**  
 Bantam/November/\$1.95  
 First publication in UK

Favorite stories from several previous collections by a master humorist and satirist who knows how to tell a good story. Younger readers might wish to discover the author of "Pilgrimage to Earth," "Seventh Victim," "Skulking Permit," and others.

**The Status Civilization**  
 Reissue/Novel &  
 Notions Unlimited  
 Reissue/Collection  
 Acc/November/\$2.25

SHEFFIELD, Charles (C)  
**Vectors**  
 Acc/December/\$1.95

The first collection of shorter fiction by the author of THE WEB BETWEEN THE WORLDS and SIGHT OF PROTEUS, ranges from ancient Persia to the Martian sewer system and explores such topics as [technological telepathy, thought control and thermodynamic dieting]. A fast-rising author, Sheffield was last year a nominee for the Campbell Award and is a practicing scientist.

SKALDASPIRRI, Sigfrour (F)  
**A Witch's Welcome**  
 Zebra/December/\$2.25  
 [Eric Brighteyes, No. 2]

Sequel to H. Rider Haggard's classic historical fantasy set in ancient Iceland. [Exiled from Iceland, and forced into viking (i.e. doomed to outlawry) for three years, Eric Brighteyes sails forth with legendary sword and trusted berserker companion, on the Gudruda, named for the woman he loved and destined because of it to be his destruction.]

SMITH, Clark Ashton (C)  
**The Black Book**  
 Arkham House

SPRINGER, Nancy (F)  
**The White Hair**  
 Pocket Books/December/\$2.25  
 Second in a trilogy.

Set earlier in the same universe as the author's first novel, THE BOOK OF THE SUN, which seems to have won her a small but appreciative following, this is an uncharacteristically short epic

fantasy, told in a simpler style than her earlier work, with a stronger emphasis on depiction of character and narrative continuity.

STURGEON, Theodore (C)  
**The Golden Helix**  
 SF Book Club(Nelson Doubleday)/November/\$2.49  
 Dell/May, 1980

Nine previously uncollected stories, including "The Skills of Xanadu," "The Ultimate Egoist" and the title story.

TAKEI, George  
 ASPIRN, Robert  
**Mirror Friend, Mirror Fox**  
 Playboy/December/\$1.95  
 Title in manuscript: "A Mirror Unto..."

The 'ninjas' were the "invisible assassins" of feudal Japan, whose secret role was frequently unknown, even to members of their own families. A "Space-Age version" of such a man is the hero of this collaboration between a fast-rising writer known for his realistic military narratives and George Takei, who, born in a wartime concentration camp for Japanese-Americans, went on to play Star Trek's Mr. Sulu (he's in the movie, too).

TUBBS, E.C.  
**Iduna's Universe**  
 DAW/November/\$1.75  
 (Dumarest of Terra series, No. 21)

To win his freedom from the slaves of the Matriarchy of Onorid, Earth-seeker Dumarest must enter into the mental universe of the Matriarch's daughter. When he follows Iduna into the mind-trap of the Tau, Dumarest finds himself in the private cosmos of a [retless and spoiled planetary princess], in which she is god, judge and executioner.

VANCE, Jack (C)  
**Green Magic: The Fantasy Realm of Jack Vance**  
 Underwood-Miller/October/\$15.00  
 1500-copy limited edition.

Cover frontpiece by George Barr. All nine stories are illustrated by a different artist, including Barr, Fabian, C. Lee Healy, Lela Dowling and others. Special edition (175 copies only), signed, numbered and bound in imitation green leather is priced at \$25.00.

**The Face**  
 DAW/November/\$1.95

[Demon Princesses series, No. 4]  
 The slaving raid in which Kirth Gersen's wife and children were slain was a minor offense in the long catalog of villainies committed by the five now powerful but shadowy criminals known to the galaxy as the 'Demon Princess,' but Gersen had sworn revenge and his memory was long. He only managed to dispose of three of them, however, before Vance grew tired of writing the same basic storyline over and over and abandoned the series. When Don Wolheim acquired the earlier novels for DAW, he was successful in persuading the author to resume.

**Moriconi: A Tale of the Dying Earth**  
 Underwood-Miller/December/\$20.00  
 1200-copy edition.  
 200-copy special edition: \$25.00.  
 "A very large, 9 x 12 hard cover for collectors, with a full-color wraparound dustjacket, decorative endpapers and more than a dozen interior illustrations and color frontpiece by Stephen E. Fabian."

This novelle originally appeared in Flashing Swords!, No. 1 (1973).

**The Languages of Poe**  
 Underwood-Miller/August/\$15.00  
 Reissue/Novel  
 500-copy edition.

**The Blue World**  
 Underwood-Miller/August/\$5.00  
 600-copy edition.  
 Frontispiece by Cathy Hill.  
 First hardcover edition.

**Servants of the Wankh**  
 Underwood-Miller/December/\$15.00  
 [Tschal, Planet of Adventure Series: Volume Two]  
 Illustrations: David Ireland.  
 Order from: Chuck Miller/239 North Fourth Street/Columbia PA 17512.

VIVIAN, E.C. (F)  
**Fields of Sleep**  
 Donald M. Grant/October/\$12.00  
 Illustrations by Tom Canty.  
 First publication in UK (1973).

WALTERS, Hugh (J)  
**The Blue Aura**  
 Faber & Faber/November/\$10.50  
 For ages 10-13.  
 First publication in UK.

[Astronauts, UFOs, and the United Nations come together on the isle of Guernsey.]

WELLMAN, Manly Wade (F)  
**The Old Gods Awaken**  
 Doubleday/December/7.95  
 [John series No. 2]

WILLIAMSON, Jack (O)  
**Three from the Legion**  
 SF Book Club(Nelson Doubleday)/December/\$4.50+  
 Contains: The Legion of Space, The Cometeers, One Against the Legion.

YOUNG, Jim  
**The Face of the Deep**  
 Pocket Books/December/\$1.95

A terrestrial expedition to Bok II, home of the galaxy's one other intelligent race seeks to warn this medieval culture of the impending explosion of their sun, but the alien natives throw them into prison.

ZELAZNY, Roger (F)  
**The Belis of Shoredan**  
 Underwood-Miller/May/\$4.00  
 300-copy limited edition.  
 Illustration by Matt Gollig.  
 Story first published in Fantastic (March, 1963).

#### ANTHOLOGIES

**New Soviet Science Fiction**  
 Macmillan/November/\$10.95  
 [Soviet Science Fiction Series XI]  
 Introduction by Theodore Sturgeon.

ASIMOV, Isaac  
 GREENBERG, Martin Harry  
 WAUCH, Charles G. [editors]  
**The Science Fictional Solar System**  
 Harper & Row/October/\$11.95  
 Postponed from August.

CLEM, Ralph S.  
 GREENBERG, Martin Harry  
 OLANDER, Joseph D. [editors]  
**No Room for Man: Population and the Future Through Science Fiction**  
 Littlefield, Adam & Co.  
 (81 Adams Drive/Box 327/Totowa, NJ 07501)

GRANT, Charles L. (F)  
 Shadow II  
 Doubleday/November/\$7.95

GREENBERG, Martin Harry  
 OLANDER, Joseph D. [editors]  
**Science Fiction of the 50s**  
 Avon (trade, large format)/September/\$4.95  
 SF Book Club/February/\$3.98+

GUNN, James [editor]  
**The Road to Science Fiction 3: From Heinlein to Here**  
 NAL Mentor/December/\$2.50

MALZBERG, Barry N.  
 GREENBERG, Martin Harry  
 OLANDER, Joseph D. [editors]  
**Neglected Visions**  
 Doubleday/October/\$8.95

OFFUT, Andrew J. [editor] (F)  
**Swords Against Darkness #5**  
 Zebra/November/\$2.25

POURNELLE, Jerry [editor]  
**The Endless Frontier: Volume One**  
 Ace/November/\$1.95  
 [Man has not reached his limits!]  
 New stories about life on L-5 colonies and other extraterrestrial bastions of Humanity.

SALMONSON, Jessica Amanda [editor]  
 Amazon  
 DAW/December/\$2.25

SCITHERS, George [editor]  
 Isaac Asimov's Marvels of Science Fiction  
 Dial/October/\$9.95  
 Contents same as ISAAC ASIMOV'S SCIENCE FICTION ANTHOLOGY: VOLUME TWO (Fall-Winter, 1979).  
 Davis Publications/October/\$2.25

SILVERBERG, Robert [editor]  
**The Androids Are Coming**  
 Elsevier-Nelson/October/\$8.95

**The Best of New Dimensions**  
 Pocket Books/December/\$1.95

TORGESON, Roy [editor]  
 Chrysalis Five  
 Zebra/September/\$1.95

Other Worlds #1  
 Zebra/December/\$2.25

WEEKS, John [editor] (F)  
**The Dream Weavers: Tales of Fantasy**  
 —Short Stories by the Pre-Raphaelites  
 Woodbridge Press (A Banquo Book)/November/\$5.95

WOLF, Leonard [editor]  
**Wolf's Complete Book of Terror**  
 Clarkson N. Potter (dist. by Crown)/August/\$14.95 & \$8.95  
 Illustrated.

—G—

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# Reviews

edited by  
Floyd Kemske



JEM  
by Frederik Pohl  
St. Martin's, \$10.00

Reviewed by Alan Ryan

**C**RRAFT BECOMES art when the artist dares to take risks. And gets away with it. Consider: John Gielgud bows his head and murmurs, "Ah." It works—miraculously—and the last row in the balcony shivers. Rudolf Nureyev invents a near-impossible combination of *entrechats* for himself and terrorizes the audience—not with the likelihood of failure, but with the possibility of it and the scale of his daring. Picasso reduces drawings to a few spare lines, making each one exquisitely crucial. Woody Allen, in *Manhattan*, risks the delicate balance of the entire movie on the single final line.

Frederik Pohl seems now to be at a point in his career where risk-taking comes naturally. His recent books—*Man Plus*, *Gateway*, and an autobiography, *The Way the Future Was*—suggest a growing refinement of craft and a mature seriousness of purpose. Certainly these books are hard acts to follow and anything less than a major work—one

with size and scope and daring—would have disappointed. In his latest novel, *Jem*, Pohl takes a lot of risks, and so many of them work out so well that the book raises craft to the level of art.

Pohl's first risk is in setting the book in the near future, sixty years or so hence. The danger is that any informed reader can predict—or thinks he can predict—what the world will be like then. Pohl's setting must therefore be a carefully projected version of what can be reasonably, believably, expected. He succeeds. While national boundaries and loyalties have far from broken down, the world of *Jem* is now divided into three major blocs, each centered around one of the world's major resources. The blocs are Food, Oil, and People, dubbed popularly the Fats, the Greasies, and the Peeps.

Into this world comes a small star with a planet, Jem, that promises rich rewards for any power that can explore and exploit it. With admirable and understandable patriotism and passion, all three blocs independently start programs to do just that. And off to Jem with them go all the patriotism, all the passion, all the pride and greed and lust for power that characterized human life before the advent of Jem. And, in due course, the struggles and rivalries on Jem echo back to earth and aggravate even further already existing tensions there. Pohl paints a grim world.

The picture is further complicated by the three intelligent life forms that inhabit Jem: the Creepies, who are burrowers, the Krimpits, who are crab-like creatures, and the Balloonists, gasbag-shaped flying creatures. Each has a complex and subtle social structure, and each is quite as capable of desires and emotions and weakness and failure as any of the humans who "invade" their world. Pohl takes the same great care in limning the motivations of individual aliens as he does with individual humans. Every faction, both alien and human, is represented by several typical and sympathetic personalities. The differences, as you might expect, are not great.

What you might not expect is the extraordinary level of sympathy, of benign tolerance, of abiding gentleness, of all-forgiving love and hope, not just for the humans, but for anything that is alive and aware of itself. Every one of the characters, human and alien, acts from motivations that are, if not always admirable, at least honest. They do what they have to do. And they don't do it by halves. And that is admirable.

They are a varied group and, although Pohl is unsparring in his portraits, we are never allowed to forget that they are acting by their best lights. Marge Menninger, for example, is young, attractive, bright, sexy, quick, eminently likable. She also pulls a lot of weight in

Washington, as her father is kingpin of the American military establishment. When Marge wants something, she knows how to get it. And if that means using the ultimate womanly wile, she goes to it with pleasure. Long after we have come to like and admire her, she swears, "I'd fuck a Krimpit if it would help the war effort." A page later, she draws a thoroughly unbelievable—for her—distinction between fucking and making love. By that point, we really don't like very much either her, her goals, or her methods. At the same time, we have to admit that she is both wonderfully alive and woefully human. Pohl knows it and he makes us see it, too.

It would be a disservice to both Pohl and the reader to outline the plot in too much detail. (Witness the recent loud cries when John Gardner indicatively gave away crucial events in the plot of William Styron's *Sophie's Choice* in the *New York Times Book Review*.) Pohl's plot moves deliberately and subtly on emotional and psychological levels. It is enough to say that the web of events, the growing network of small decisions, the pull of individual emotions, the series of misunderstandings, that constitute the plot form, in the end, a moving and frightening and seemingly inevitable declension into madness.

At the same time, Pohl succeeds in distancing the reader from the action of the book so that, like him, we can look on at the characters and events with his own bemused and sympathetic tolerance. For this purpose, he adopts a point of view that—literally from the first sentence—keeps us aware, to the right degree, that we are reading, that this is a story, that we can from time to time stop, evaluate, wonder how it will all turn out, question and challenge the characters, muse with the author. "What can be said of someone like Danny Dalehouse?" Pohl writes near the beginning of the book. And at the end: "And so, at the last, what can one say of them?" We are forced—by the logic of sympathy—to agree with Pohl's final conclusion: "They did what they could. More often than not, they did what they thought they should." All things considered, it's a satisfying epithet.

There are minor flaws in *Jem*, too. For example, in a society where marijuana is smoked as openly as tobacco is today, one hardly expects to have to "clean a batch." And save the seeds. I wish that Danny Dalehouse, a professor of space sciences, did not have such a cute and boyish name. I wish Marge's father were not named Godfrey and referred to as "God." I wish the Russian pilot, Kappelyushnikov, spoke better English; he sounds rather like Dan Ackroyd playing a "wild and crazy guy." But if the book has imperfections, it has an equal number of attractive grace-notes. A



chaplain is assigned to the Food Bloc Encampment on Jem; he used to teach math at Fordham, his name is Vince Cudahy, and he has agreed to "be non-denominational." That sounds just right to me.

For all its seriousness and its deep probing of human nature, *Jem* is that most rewarding of all books, a good read. Pohl's narrative is straightforward, his prose fast and clean, his technique easy and sure. And the risks taken—in setting, characterization, scope, point of view—are all carried off triumphantly.



#### THE UGLY SWANS

by Arkady and Boris Strugatsky  
translated by Alice Stone Nakhimovsky  
and Alexander Nakhimovsky  
Macmillan, \$9.95

Reviewed by Patrick L. McGuire

**Y**OU MAY have heard of *The Ugly Swans*—it's one of the Strugatsky brothers' more controversial works. Originally scheduled for issue by Young Guard Publishers in Moscow in 1968, *The Ugly Swans* ran afoul of the censor, and has not seen print in the Soviet Union to this day. It has circulated widely in *samizdat*, however, the first work of Russian SF to lead such an underground life since Zamyatin's *We* (1924). This *samizdat* circulation may or may not have been sanctioned by the authors: *Ugly Swans* had probably been through some of the preparation for publication by the time it was banned, and there must have been several manuscript copies floating around by then. In any event, at least one copy found its way westward, and an emigre publishing house in West Germany brought out an edition in Russian dated 1972. This action gave the work a wider audience, but evidently landed the Strugatskys in more hot water. The West German publisher had indeed announced that it was acting without the Strugatskys' knowledge or consent, but the Soviet regime tends to assume that any foreign publication of a proscribed work has been connived at by the author. The Strugatskys have had a rather rough time of it in the seventies, and *Ugly Swans* may be

one reason why. In any event, at last the English-speaking reader has the opportunity to judge the work for himself.

It turns out that the plot of *The Ugly Swans* bears similarities to a number of other Strugatsky stories, especially to *The Final Circle of Paradise* (1965). *Ugly Swans* is set in a mythical European country, in a hedonistic, decadent society which is supposedly capitalist (and which uses the tsarist Russian "Table of Ranks"), but which in many respects resembles the Soviet Union. The hero, Victor Banev, is a prominent novelist with a somewhat shopworn reputation for liberalism. Because of minor political indiscretions, he has been exiled from the capital to his home town. He finds the place much changed. For one thing, the climate has gotten much rainier, ruining the resort trade. For another, the number of "slimies" in the area has increased dramatically. The slimies, generally regarded as the victims of a genetic disease and concentrated in a special asylum near town, are increasing in power as well. They display amazing physical stamina and intellect, and Banev gradually comes to realize that the slimies are even somehow responsible for the change in climate. Moreover, they have gained a mysterious influence over the local children. These have become very serious, intellectual, and bookish, as if to balance out the older generation's preoccupation with distraction and pleasure. Banev himself had intended to use his exile to work, but instead he divides his time between nightly carousals at the hotel bar and pursuit of his latest mistress. But Banev does retain some of the better instincts of his youth. The growing numbers and power of the slimies have made them the target of persecution by local authorities and townspeople, and Banev comes to the defense of the slimies with all his liberal flags flying.

So far this sounds a good deal like the standard "mutant story" of Western science fiction. But in the Western works, we come to understand the persecuted mutants and to sympathize with them. By contrast, *Ugly Swans* sets Banev the more difficult task of defending beings whom he doesn't fully understand, or even particularly like—and who seemingly do not even much want to be defended. For a while, Banev's renewed concern for justice brings him nothing but good—he cuts down on his drinking, starts writing again, and becomes more serious about his mistress Diana—but eventually the conflict between the regime, which Banev detests but at least understands, and the mutants' new order, which Banev cannot comprehend or fully participate in, turns into outright warfare, and Banev must decide once and for all just where he stands.

[Continued on page 93]

## Best Sellers

Compiled as of October 1, 1979

#### HARDCOVER

1. **The Flight of Dragons**  
Peter Dickinson/Harper & Row
2. **Dead Zone**  
Stephen King/Viking
3. **Jesus Incident**  
Frank Herbert & Bill Ransom/Putnam
4. **On Wings of Song**  
Thomas Disch/St. Martin's
5. **Language of the Night**  
Ursula LeGuin/Berkley-Putnam & Titan  
John Varley/Berkley-Putnam
6. **A Planet Called Treason**  
Orson S. Card/St. Martin's

#### PAPERBACKS

1. **Courts of Chaos**  
Roger Zelazny/Avon
2. **Quag Keep**  
Andre Norton/DAW
3. **Silverlock**  
John Meyers Meyers/Ace
4. **Dreamsnake**  
Vonda N. McIntyre/Dell
5. **The Ultimate Enemy**  
Fred Saberhagen/Ace
6. **The Avatar**  
Poul Anderson/Berkley
7. **Tales of Neveryon**  
Samuel R. Delany/Bantam
8. **Hestia**  
C.J. Cherry/DAW
9. **Saint Camber**  
Katherine Kurtz/DelRey

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# Entertainment

David Gerrold

**N**O CHRISTMAS IS ever complete without the traditional cranky Christmas curmudgeon. It's more fun to be Santa Claus, of course, but like it or not, sometimes you have to report the bad news too, no matter what time of the year.

Let's back up a bit. Charlie Ryan (ye olde editor) called in August and asked if there was any way I could review *Star Trek—The Movie* or perhaps *Meteor* or *The Black Hole* in time for the December issue.

No, there isn't.

Sorry, Charlie, but it's easier to get in to see a United States Senator than it is to see a major studio film before the studio wants you to. (Honest.) There was simply no way to meet this issue's deadline, which as you read this column, was two months ago.

However...

A few words about each of these films may be in order anyway.

First *Star Trek—The Movie*. (Is there some reason they picked December 7th for the premiere? Pearl Harbor Day?!!)

The day after a Paramount hired-mouth told me that nobody, but nobody at all had seen the rough cut except Gene Roddenberry, Robert Wise, and Susan Sackett (who is writing the book about how it was made), I found out that quite a few people have in fact seen the rough cut—including two fellows who flew in 92 GALILEO

from New York for no other reason than to have a special screening because they were about to start work on the comic book version. All of which means nothing except that once again Paramount's left hand doesn't know what its right hand is doing, and once again, truth—no, make that accuracy—is the victim. Nice going, guys.

But couple that with the special effects fiasco (—oh, you hadn't heard? *New West* magazine reported recently that Robert Abel Associates spent \$6,000,000 of Paramount's money without delivering a single useful shot; they have since been replaced by Doug Trumbull, who has a reputation for being such a perfectionist that he delayed the release of *CE3K* for six months; but Paramount has installed a special executive in Trumbull's offices to make sure he meets his deadlines and, oh, by the way, Trumbull's contract is very interesting—it says that he will turn in effects on time for the December 7th release date, but if he can go to January, He'll turn in even better effects, and if he can go until February—never mind, you get the idea—), plus the fact that the picture is now the third most expensive motion picture in the history of motion pictures (some \$42,000,000) after *Cleopatra* (\$44,000,000) and the Russian *War and Peace* (\$100,000,000), and will have to earn at least \$84,000,000 to break even (translation: it will have to be one of the

most successful movies in history too), not to mention the scuttlebutt I have from a very reliable source that certain highly placed Paramount executives are looking very worried these days—and add in a dash of skepticism from some of those who have been close to *Star Trek* in the recent past, and one comes away with the uneasy feeling that *Star Trek—the Movie* may not be as much an entertainment event as it is going to be a financial and political one.

Me? I've adopted a wait and see attitude. I've had this particular wait and see attitude for nearly seven years now, so it comes easy, it's an old friend. There are some good people involved with the film, and there has been a hard commitment from all of them. If the film is good, I'll enjoy it and I'll say so. If it's even competent, I'll be...uh, satisfied. (Although, knowing that some \$42,000,000 was spent on the film—more money than was spent on all 79 of the television episodes, the 22 animated episodes, and all of the books together—makes it difficult to expect anything less than the second coming of *The Sense of Wonder*.) If the film is less than competent, I shall probably say nothing at all. Watch this space very carefully.

*Star Trek* is one of those subjects that science fiction people are something less than fully rational about. Because of my past association with the show (I did rewrite on one episode, and some other stuff too), a lot of people have been asking me my opinion. Personally, I would prefer to sit out the uproar. And no matter whether the picture is terrific or a stinker, I expect it to start a terrific round of uproar in the community. Little kids will probably love it. Big kids will enjoy it with a bit of skepticism ("They changed the uniforms?!") and those who have...uh, outgrown it will try to enjoy for what it is and not ascribe too much importance to it as pure science fiction (whatever that is).

By the time this column appears, we should be getting the early returns.

Meanwhile, in another part of the forest, *Meteor* was previewed recently for some special effects men. The reason? The effects that had been delivered were so awful that even the studio executives realized they couldn't release the picture with those scenes in it. They had a problem and they had to do something about it fast, so they called in a lot of different effects wizards and asked them what could be saved. The answer: nothing. One of the wizards who saw the film said that the effects were the absolute worst that he had ever seen in his life. (Even worse than *Planet of the Dinosaurs*? I asked. Even worse than *Planet of the Dinosaurs*, he said. By the way, don't hold your breath looking for that one either. It's so awful, they can't find an American distributor stupid

Entertainment

enough to take it. One of the legendary stinkers.)

Anyway, *Meteor* is coming. Five miles wide, etc., etc. And there is no place to hide from it. Will it be the biggest disaster film in history, or just one of the biggest disasters in Hollywood? Who knows? Are they reshooting the effects? My source says they have no choice but to, otherwise they're going to get laughed off the screen and lose their entire investment. And they can't possibly reshoot all of their effects and make their release dates. Oh, dear... By the time this column appears, we should know what kind of a hole the *Meteor* is going to make and where.

Speaking of holes...*The Black Hole*, at least, promises to be visually stunning. Even the trailer for it is beautiful. The Disney studios have committed a lot of money to making this an extraordinary film. Except perhaps in the area of the...script. The story—from all descriptions I have heard (and again I am reporting information gained from a fairly reliable inside source) sounds very much like *20,000 Leagues in Space*. Sort of. A mile long spaceship, a mad scientist, his team of killer robots, an eighteenth century drawing room...

Who knows? It may work. Would you have believed the plot of *Star Wars* a month before the film was released?

No real prediction here. But from what I've heard about the ending of the film, I have a very bad feeling. It could be very unsatisfying for people who like their science fiction to have clear-cut answers to the questions raised. (Personally, I haven't really liked any Disney film since *Mary Poppins*; a sure sign of curmudgeonry, that.)

So, this Christmas, SF film-fans have three very big and very expensive presents coming their way—the question is, will any of these presents be worth the wait? I hope so, because I hate to see audiences disappointed—but if not, well, there always *The Empire Strikes Back*, opening in May. Reliable rumor has it that there will be a lot of stop-motion animation in the *Star Wars* sequel, Goody. (And, as long as I am reporting rumors, here's one that was planted by someone who actually works for *Star Wars*: the closing shot of *The Empire Strikes Back* may be a holographic projection, wherein the *Millennium Falcon* will swoop off the screen right out over the audience's heads. But it's only a rumor, and I wonder why anyone would want to spread this kind of story. Commercial holography has not yet reached that level of sophistication—and if there's been some kind of important breakthrough, none of the holographers and laser-show experts I've queried know anything about it. Ah, but it is something to dream about, isn't it?)

—G—

Entertainment/Reviews

## Reviews

[Continued from page 91]

What in particular was it in this story that the Soviet regime choked on? Was Banev in his ambivalence a little too reminiscent of, say, Yevtushenko? Was "Mr. President" a bit too much like Stalin? Did the picture of Rem Quadriga, an artist who has sold out to the regime, strike a little too close to home? Possibly so, but similar portraits appear in other Strugatsky stories published legally both before and since. The problem may have been one of timing: 1968 is often cited as the first year of "re-Stalinization," and the regime may have decided to come down hard on the Strugatskys as an object lesson. Alternately, the real problem may have been one of form rather than content. *Ugly Swans* has quite a few sex scenes, discrete by American standards but more explicit than anything else I've seen in Soviet SF. Even more serious from the viewpoint of form is the novel's final chapter. Now, there may or may not be a "rational explanation" for the seeming miracles depicted on these pages. The wonders themselves are much like the psychological-warfare plays depicted in, say, Heinlein's *Day After Tomorrow*. But in

*Ugly Swans*, we view events not from the viewpoint of the slimies, but from that of the awe-struck and terrified townspeople. The novel's ending has the feel of a religious apocalypse, of the ending of one world and the beginning of a new one. From the viewpoint of the Soviet regime, this is "mysticism" of the baldest sort. We must all be good materialists, comrades, even in fiction.

I've devoted considerable space in this review to the publication history and the political ramifications of *Ugly Swans* because I think they're exceptionally interesting, and because nowhere on the jacket or in the volume does Macmillan give any hint of them. But the average American reader is doubtless more interested in knowing whether *Ugly Swans* works as a story. It does. The writing is up to the Strugatskys' usual vivid form, and on the whole this is conveyed with fidelity and high accuracy by the translation. There's no hard science here, and the pace may be a little too deliberate for anyone strictly into adventure fiction. But anyone who enjoys, say, the work of Frederik Pohl or Ursula Le Guin should consider *Ugly Swans* to be a real find.

—G—

Roger Dean, from Galileo's forthcoming "Portrait of an Artist as Entrepreneur."



Photo credit: Charles C. Ryan

# Telescope

## Our future

The next issue of Galileo begins the three-part serialization of *Worlds*, an incredible new novel of space colonization and Earth politics by Joe Haldeman.

"For nine decades I've been making love," she said. "For eight decades I've been recording that love, rehearsing it, choreographing it. What does that suggest to you, Box? Be profound."

"after people have repeated a phrase a great number of times," the computer said, "they begin to realize that it has meaning and may even be true."

"Not bad, Holmes?"

"H.G. Wells..."

—Lydia

—by Tony Sarowitz

"They came in over the Florida coast to a vista of breathtaking and, to O'Hara, thoroughly alien beauty. The sun was low in the west, almost dim enough to look at directly, illuminating a spectacular array of high cumulus, crimson and gunmetal against a deepening sky. The ocean was almost black, studded with froth that the sun tinged red, the horizon had lost its curve: for the first time in her life the Earth was not just a planet, however special. It was the world."

—*Worlds*, A Novel of the Near Future

—by Joe Haldeman



Bubble memory devices provide large amounts of computer storage in very small packages.

# Encyclopedia Galactica

Eric Blair

## DIAGNOSIS WITHOUT DESTRUCTION

**A** NEW DEVICE IS making ultrasonic scanning of humans an effective replacement for surgical procedures, such as biopsies, that are performed just to check out tissue samples. Termed noninvasive monitoring (the body isn't entered), ultrasonic imaging uses banks of sensors in a manner similar to a sophisticated radar system called a phased array. A charge-coupled device (CCD) developed by John Shott of Stanford University acts as an electronic lens, forming the heart of the scanning system that illuminates soft body tissue.

Noninvasive techniques not only save time, money and make better use of scarce hospital facilities, but also provide safer treatment for the patient; ultrasonic imaging, as opposed to surgery, offers no known patient risk.

As with traditional X-ray scanning, the information must be interpreted to be used. The addition of microcomputers to imaging systems furnishes the diagnostician with special features such as color enhancement—a technique that uses color to exaggerate subtle differences in tissue shading that might indicate diseased or damaged organs. As doctors and computer programmers learn to work together we approach the reality of mobile 10-minute checkup stations that

can pinpoint minute traces of physical malfunction. Maybe off-the-shelf replacement parts are next.

## TINY BUBBLES THAT REMEMBER

**T**HE CURRENT thrust of computer technology moves it toward making the machinery more compact. The challenge is to provide consumers with intelligent appliances for their homes that actually improve the quality of life.

One technological stumbling block has been the physical size of computer memories. The computer's memory contains its instructions and furnishes it with a place to store numbers that it uses in following those instructions—numbers such as the time to turn on the oven and the temperature to set it to. Recent introductions of magnetic bubble memory devices are breaking down this size barrier, however. Intel Corporation's Magnetics 7110, for example, stores 1,048,576 bits of information in one integrated circuit.

Some types of memory devices erase their contents when power is turned off; bubbles don't. This becomes important when they are used in remote locations or in areas where the supply of electricity isn't reliable. This trait, combined with the large amount of storage they provide for their size, suits bubble memories for

inaccessible, weight-conscious installations, such as satellites. It also hastens the day when homes can become computer-controlled environments. Large capacity memories allow you to give your home's master console detailed instructions, such as, "Water the back yard for an hour, starting at six P.M.; turn the oven on to 400 degrees at seven P.M.; turn on the porch light at dusk; maintain the indoor temperature at 72 degrees until ten P.M."

## COMPUTERS GIVE VOICE

**A**LTHOUGH LACKING the sophistication of a HAL 9000 or Mycroft of *The Moon is a Harsh Mistress*, computers are about to become the chattiest appliances on the market. This doesn't just impact the giant government and industrial computers either; most of the developments are taking place in the consumer market. The popular Apple and Radio Shack computers, for example, can be equipped with add-on boxes that give the computer control over what it says—it is restricted only by its vocabulary (typically a few hundred words), not by any prerecorded messages.

Much of the research that brought these changes about resulted from efforts to make talking calculators for the blind. A blind person can now buy a hand-held, standard four-function calculator that offers a 24-word vocabulary for about \$400. Another byproduct of computer-voice research is a technology called Linear Predictive Coding (LPC). Using a filter that represents the human vocal tract as a model to get word sounds right, LPC made the low-cost Speak & Spell from Texas Instruments, Inc. possible. Containing 140 words, the unit not only teaches spelling, but plays games too.

LPC isn't the final answer, however. The processes of determining correct digital representation of human utterances through modeling is an expensive and time-consuming process. Recent developments in the use of delta modulation—a Bell Labs development—indicate that as the price of key components fall, a form of delta modulation may make truly low-cost voice output a reality.

While you wait for computers to be outfitted to outpeak humans, you might run across an acquaintance claiming to own a talking computer. You can make a quick test of just how well it talks and impress your acquaintance at the same time by having the computer recite, "Joe took father's shoe bench out," and "she was waiting at my lawn." These two sentences, according to a 1931 Bell System Technical Journal, contain all of English's fundamental sounds.

—G—



Dear Editor,

I am a voracious reader of SF, with subscriptions to many clubs, magazines, etc., including yours.

With that as a preamble I also want to say I have never written to an editor, most of those letters are self-important rubbish.

However, I must write to you about the fantastic story "Court of the Timesifiers" by Mary Schaub in the September issue. Wonderful! Refreshing! Marvelous! etc. etc.

You say she is writing a book!!! That beautiful story is a cinch for a sequel or, better, a full length book!

Please, please encourage her in that direction and publish the name of the book or better the book itself in your magazine! So we can line up at the book stores!

Yours most gratefully,

John D. Van Dyke  
Burlingame, California

Dear Sandra Miesel,

Although it probably wouldn't have mattered to those who read your fine article on Kelly Freas in the September issue of *Galileo*, I would have been pleased to see a quick mention of myself as author of *Brandyjack*, the book for which Kelly did such an excellent cover, a part of which you displayed on page 12.

# Inquisition

## Letters

Perhaps I'm being a touch sensitive about the whole thing, but after taking tons of crap from fans who sneered at *Brandyjack*—without reading it, since Laser published it—and at me for writing it, I have come to enjoy mention of my name unburdened with sarcasm and contempt. Ahh well, perhaps it's just as well...it probably would have been spelled wrong.

Anyway, an informative and interesting article.

Best...

Augustine Funnell  
Gananoque, Ontario

*Sandra Miesel was not responsible for the captions attached to the illustrations of that article. They were prepared in this office and the error of omission was ours. Our apologies.* —Ed.

To The Editor:

I have been reading *Galileo* since it began, and have never taken the opportunity to write about my feelings for it. Tonight, though, after picking up the September issue and reading through it, I just couldn't refrain from writing. I am fairly picky about what I read (not before I've read it, but afterwards) and this month's readings were typical of *Galileo*. I loved them!

Your magazine has fairly consistently been unparalleled by other similar magazines in the variety and quality of the articles, art, layout, and not least, of the stories.

Significant in the September issue were the thoughtlessly-provoking ramblings of Murphy's "Doomsayer" and the beautifully unpretentious reviews of "Entertainment," by David Gerrold. The continuing story of *The Ringworld Engineers* is a credit to Larry Niven's genius and to *Galileo*'s good taste. But the prize this month goes to Connie Willis for "And Come From Miles Around."

Keep up the excellent work and keep those cartoons coming, they added a nice extra spark to a magazine that is burning its way to immortality. Thank you!

Sincerely,

Tim Larson  
Erie, Pennsylvania

### Profile

[Continued from page 6]

to guest commentary. In this issue, Hugo and Nebula winner Joe Haldeman makes an unsettling analogy between Columbus's discovery of the New World and our failed attempts at conquering space. Haldeman fans take note: starting in next issue, *Galileo* will begin serializing his new novel, *Worlds*.

In "Eat Your Heart Out, Gloria Marshall," Ray Ellis gives a humorous look at every weight-watcher's supreme fantasy—to see that the rest of the world should diet with him. The source for his contribution was "the last five minutes of a radio interview and a solid week in the library." Mr. Ellis, who says he is 25, going on 38, came to be interested in science fiction because he heard it was "a good way to meet girls." This is his first published story in *Galileo*.

Justin Leibler returns to *Galileo* with a persuasive argument on the legal rights of sentient apes and intelligent computers. An Oxford-educated philosopher, with three scholarly books to his credit, he is now working on a novel.

Prostitutes have long been the heroines of novels, but this is the first time a "lady of the night" makes her appearance in *Galileo* with the story "Passage To Earth." The author, Leanne Frahm, who was referred to us by SF writer Terry Carr, is a new writer and housewife who lives in Queensland, Australia. This is her first published sale. —G—

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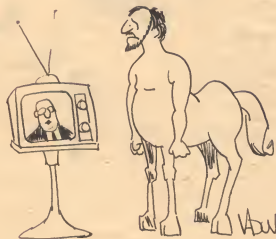
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## Star Chamber

Robert A. Heinlein

**T**HE STANDARD dust jacket blurb on Robert A. Heinlein says he was born in Missouri in 1907, graduated from Annapolis in 1929, spent ten years in the U.S. Navy, and has won the Hugo Award four times. It also says he is the leading science fiction writer in America, if not the world. All of this is true, but it points up the possibility that the standard dust jacket blurb is not the appropriate form for assessing the phenomenon that is Robert A. Heinlein. Since the appearance of "Life-Line" (*Asiounding*, 1939), he has been a shaping force in the genre. *Starship Troopers* (1959), *The Moon is a Harsh Mistress* (1966), and *Time Enough for Love* (1973) are among the most famous of the field's classics. *Stranger in a Strange Land* (1961) "broke out" when it was published and has left an indelible mark on modern culture at large. Regardless of how anybody feels about Mr. Heinlein's work, the fact that literary critics are busy dividing it into periods (most of them accept three) is a high compliment to pay a genre writer. Behind these literary achievements, however, there is a man who inspired and sustains a tradition of blood drives at science fiction conventions, who undertook a conscious campaign to educate young readers by investing the time and effort to write a series of novels for juveniles, and who once said he wrote science fiction because after he sold his second story he "was hooked, having discovered a pleasant way to live without working." Having recovered from serious brain surgery last year, he has completed a new novel, *The Number of the Beast*, which was sold for a record setting advance of half a million dollars and is scheduled for publication by Fawcett Books in the spring of 1980.

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TONIGHT'S WEATHER ISN'T FIT  
FOR MAN NOR BEAST.

Robert H. Steinlin









Joan D. Vinge • Joe Haldeman • Larry Niven

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